Matrix Environmental, Inc.
1880 W. Winchester Rd., Suite 111
Libertyville, Illinois 60048
Phone: 847-367-6835
Fax: 847-367-6845

24 January 2008

Ms. Bhooma Sundar
U.S. Environmental Protection Agency
Region V
RCRA Enforcement and Compliance Assurance Branch (DE-9J)
77 West Jackson Boulevard
Chicago, Illinois 60604

Re: Central Wire, Union, Illinois Groundwater Modeling Report

Dear Ms. Sundar:

Enclosed please find the revised groundwater modeling report as stated in monthly compliance reports.

If you have any comments or questions regarding the progress of this project, please do not hesitate to call me at (847) 367-6835.

Sincerely,

Carlos J. Serna, P.G.
Matrix Environmental, Inc.

CJS:sk

Attachment

cc: Gerald W. Ruopp, Central Wire
Henry Lopes, Central Wire
Scott Carr, Central Wire
Steve Hughes, Central Wire
Joyce Munie, IEPA

V. bad model.
1) cells are poorly chosen
2) no measured data @ bdry
3) limited well data
4). 2D only
5). recharge is guessed at
6). soil well exist influence but ignored!

CENTRAL WIRE UNION PLANT

TECHALLOY
CENTRAL WIRE GROUP

Groundwater Modeling Report

Central Wire
Union Illinois Plant

January 2008

Prepared for:

Central Wire Company
6509 Olson Road
Union, Illinois 60180

Prepared by:

Matrix Environmental, Inc.

1880 W. Winchester Road
Suite 111
Libertyville, Illinois 60048

EXECUTIVE SUMMARY

Matrix Enviromental Inc. (Matrix) was retained by Central Wire (formerly Techalloy) to create a groundwater flow model to evaluate the Groundwater flow and Fate and Transport of the chlorinated solvent plume. An evaluation of the hydrogeological characteristics of the study area was performed and a conceptual site model (CSM) was created that consists of integrating all relevant geological data and assembling this information into a framework to understand the physical characteristics of the site. Following the creation of the CSM, a calibrated groundwater flow model was created that simulated the groundwater flow incorporating the two Techalloy groundwater extraction wells for treatment and the two Central Sod extraction wells for irrigation. This model was used as the basis for a series of predictive simulations aimed at identifying the resulting fate and transport of chlorinated solvents in the groundwater.

The predictive simulations indicate that the solvent plume will only migrate a short distance and will not effect the downgradient extraction wells or the potable drinking water wells that occur in line with and immediately downgradient from the plume and along Illinois Highway Route 176. This is a function of the hydrologic boundary conditions, the hydraulic conductivity of the unconfined aquifer and the groundwater extraction rate. The predictive simulations suggest that the front of the contamination plume has reached a semi-stagnant region of groundwater flow and is decaying at a rapid enough pace to minimize migration of the plume. The ultimate fate of the particles within the groundwater is to decay and disperse below remediation goals before reaching Rt. 176.

1) what is nео data base

2) likely insuff for determining prediction

TABLE OF CONTENTS

Section		Page
1	PURPOSE AND SCOPE	1-1
	1.1 Site Location	1-1
	1.2 Purpose	1-1
	1.3 Scope	1-1
	1.4 Method	1-1
2	CHARACTERIZATION	2-1
	2.1 Site Topography	2-1
	2.2 Surface Water Features	2-2
	2.3 Regional Geology	2-2
	2.4 Site Geology	2-2
	2.5 Hydrostratigraphy	2-2
	2.6 Estimates of Hydraulic Properties	2-3
	2.7 Hydrologic Boundaries	2-3
	2.8 Hydraulic Head Data	2-3
	2.9 Magnitude of Groundwater Recharge	2-3
	2.10 Average Linear Groundwater Velocity	2-4
3	MODEL CONCEPTUALIZATION	3-1
	3.1 Boundary Conditions	3-1
	3.2 Model Discretization	3-1
	3.3 Aquifer Thickness	3-2
	3.4 Sources and Sinks	3-2
	3.5 Layer Properties	3-3
4	SOFTWARE SELECTION	4-1
5	MODEL CALIBRATION	5-1
	5.1 Observation Files	5-1
	5.2 Calibrated Parameters	5-2
	5.3 Calibration Results	5-2
6	PREDICTIVE SIMULATIONS	6-1
	6.1 Predictive Simulation Results	6-1
7	SENSITIVITY ANALYSES	7-1
	7.1 Hydraulic Conductivity	7-1
	7.2 Recharge	7-1
	7.3 Results	7-2
8	CONCLUSIONS AND RECOMMENDATIONS	8-1
	8.1 Conclusions	8-1
	8.2 Recommendations	8-1
	REFERENCES	

LIST OF FIGURES

Figure

1	Site Location Map
2	Site Map
3	Head Scatter Diagram
4	Simulated Hydraulic Head without Irrigation well effects
5	Simulated Hydraulic Heads including Irrigation well effects
6	Predictive Simulation after 5 years
7	Predictive Simulation after 10 years
8	Predictive Simulation after 15 years
9	Predictive Simulation after 20 years
10	Predictive Simulation after 25 years
11	Predictive Simulation after 30 years
12	Predictive Simulation after 45 years
13	Predictive Simulation after 60 years
14	Hydraulic Conductivity Sensitivity Analysis with Irrigation Well Effects
15	Hydraulic Conductivity Sensitivity Analysis without Irrigation Well Effects
16	Recharge Sensitivity Analysis with Irrigation Well Effects
17	Recharge Sensitivity Analysis without Irrigation Well Effects
18	Recharge Sensitivity Analysis 60 Year Total Chlorine Residuals

LIST OF ATTACHMENTS

Attachments

1	NRCS Soil Data
2	Soil Boring and Well Construction Logs
3	Cross-Sections
4	Previous Hydraulic Head

SECTION 1

PURPOSE AND SCOPE

Matrix Enviromental Inc. (Matrix) was retained by Central Wire (formerly Techalloy) to create a numerical groundwater flow model to evaluate the fate and transport of the existing chlorinated solvent plume.

1.1 SITE LOCATION

Central Wire is located in Section 4, T43N, R6E of McHenry County, IL (Figure 1). The property is the site of an operational metal manufacturing plant.

1.2 PURPOSE

The objective of the modeling work was to assess the effectiveness of the two existing groundwater extraction wells in remediating the existing solvent plume and determine if the two downgradient irrigation wells are interfering with their effectiveness. The purpose is to also to model the predicted extent of migration of the solvent plume over several years.

1.3 SCOPE

The scope of the model is intended to provide simulations that best represent current and future site conditions associated with the aforementioned groundwater discharge from the extraction and irrigation wells. Due to data gaps identified during the file review portion of this study, the model simulations are limited in scope to provide potential outcomes of the proposed groundwater discharge based on the current understanding of site conditions.

1.4 METHOD

Groundwater modeling projects follow a progression of recommended steps to produce a meaningful representation of the hydrogeological system. These steps include:

- Defining the purpose and scope of the model application to the site (Purpose and Scope).
- Characterization of the hydrogeologic framework (Characterization).
- Development of the conceptual site model (Model Conceptualization).
- Selection of the appropriate model software (Software Selection).
- Calibration of the model (Model Calibration).
- Comparison of the calibrated model to other field data if available (History Matching).
- Determination of the sensitivity of model simulations to variation in input parameters (Sensitivity Analysis).
- Using the model to perform predictive analyses (Predictive Simulation).

SECTION 2

CHARACTERIZATION

The following hydrogeological information was considered during the development of this groundwater flow model:

- Topographic data (including surface water elevations).
- Occurrence of surface water bodies.
- Regional geologic data.
- Site geologic data (well logs and geologic cross sections).
- Hydrostratigraphy.
- Estimates of hydraulic properties.
- Hydrologic boundaries.
- A depiction of the horizontal and vertical distribution of hydraulic head data and hydraulic gradients.
- Magnitude of Groundwater discharge
- Average linear groundwater velocity (direction and magnitude).

2.1 SITE TOPOGRAPHY

The surface topography of the subject site is relatively flat farmlands. Surface elevations range from 840 ft at the Central Wire facility to 820 ft at the intersection of Dunham Rd and Rt. 176. The slope of the subject area is approximately 0.1% towards the northwest. The area is bounded on the east and west by streams.

2.2 SURFACE WATER FEATURES

Several surface water features exist within the study area, most notably are the streams to the northeast and southwest. To the northeast is the Kishwaukee River, there is no applicable streamflow data within 10 miles of the subject site. The stream flows to the southwest, no data was able to be acquired. Due to the sparse data able to be acquired, stream properties were assumed by observation of topographic maps.

2.3 REGIONAL GEOLOGY

The surficial geology in this portion of Mchenry County is composed of mainly outwash material. Based on well logs and past cross-sections, these deposits are 50 to 120 feet thick and overly shale and limestone. Based on information obtained from the NRCS Soil Data Mart, the major component of the soils are well drained and not prone to flooding or ponding (Attachment 1).

2.4 SITE GEOLOGY

The site geology is in close agreement with the generalized regional geology. Well logs conducted near the subject site report layers of top soil underlain by sand and gravel mixtures (Attachment 2, Attachment 3). Underlying this sand and gravel layer is a stratum of shale underlain by limestone. Thickness of these layers is not reported.

2.5 HYDROSTRATIGRAPHY

Based on the regional and site geology described above, the subsurface was divided into 2 hydrostratigraphic groups, or units containing similar hydrogeologic properties. These units were characterized as follows:

- The near surface saturated sand and gravel unit was classified as an unconfined aquifer.

has been a 3D model before?

- The subsurface stratum of shale and limestone is classified as an impermeable aquiclude.

2.6 ESTIMATES OF HYDRAULIC PROPERTIES

Based on information obtained in Groundwater Hydrology (Todd, David K. 2005) hydraulic conductivities for medium to fine sand layers ranged from 8.2 ft/day to 39.4 ft/day. An initial hydraulic conductivity was assumed to be 14.2 ft/day based on subject site groundwater levels. A final hydraulic conductivity used is 18.2 ft/day based on sensitivity analysis.

K conservative largest to be conservative

2.7 HYDROLOGIC BOUNDARIES

Based on the hydrostratigraphic classification, the surface water features, and the hydraulic properties, hydrologic boundaries were developed. The aquifer is bounded by the streams to the northeast and southwest, both of these streams converge to the northwest of the subject area. To the south the model is bounded by a general head boundary assuming that well drawdowns will not affect the boundary.

2.8 HYDRAULIC HEAD DATA

Hydraulic head data obtained from site monitoring wells prior to pumping has been included in this report (Attachment 4). Based on the poteniometric surface map the horizontal gradient ranges 0.0012 to 0.0022. No current well levels are available.

Based on modeling the gradient varies between 0.0012 near the south edge to 0.0046 near the Central Sod high capacity irrigation well

4x?

2.9 MAGNITUDE OF GROUNDWATER RECHARGE

A uniform recharge was added over the whole site. Recharge was set at 2.20 inches per year for the entire site.

why? boundary effect?

2.10 AVERAGE LINEAR GROUNDWATER VELOCITY

Utilizing the above gradients, an estimated effective porosity of 0.30, and a hydraulic conductivity of 18.2 feet per day, the average linear velocity of groundwater ranges between 0.0328 ft/day at the south of the subject area to 0.2791 ft/day near the Central Sod high capacity well while pumping.

SECTION 3

MODEL CONCEPTUALIZATION

A conceptual site model (CSM) was created to evaluate the hydrogeological setting of the study area. A CSM consists of integrating all relevant geological data and assembling this information into a framework to understand the physical characteristics of the site, as described above.

The CSM was constructed inside of the groundwater modeling software interface (PMWin). A series of coverage's were created, that allowed for the definition of the following data: sources/sinks and layer properties such as hydraulic conductivity, model boundaries, etc. This information was then transferred to the numerical modeling software and a working groundwater model was created.

3.1 BOUNDARY CONDITIONS

Two river boundaries were assigned to the northeast and southwest of the subject site, these two rivers converge to northwest of the site. Due to the lack of stream gauge data for both rivers, flow was assumed from inspection of aerial photographs and topographic maps. A specified head boundary was set to the south of the subject site. A constant hydraulic head of 830 feet above sea level was prescribed to the boundary.

3.2 MODEL DISCRETIZATION

The model grid was established as 178 rows and 228 columns. Each row and column approximately 100 ft by 100 ft squares. Rows and columns near each well were refined to 50 ft by 50 ft to more accurately define well effects. To keep the model simplified it was kept as a 2-dimentional model.

3.3 AQUIFER THICKNESS

As this model is a 2-dimentional model aquifer thickness was not thoroughly considered. For programming purposes a top elevation of 830 feet and a bottom elevation 700 feet above sea level were assumed through the whole grid.

Justify this.

3.4 SOURCES AND SINKS

Other than the specified head boundaries and river boundaries defined above, other source and sink terms considered in the model included the two Central Wire extraction wells, the two Central Sod irrigation wells, and natural recharge. The rivers to the northeast and southwest were modeled using the river package inside of MODFLOW - 2000. Stage elevations were assigned based on topographic maps due to lack of stream gage data.

Conductance is a measure of the hydraulic conductivity of the streambed material multiplied by the width of the stream and then divided by the thickness of the streambed material. The hydraulic conductivity of the streambed materials was assumed to be 4.75 ft/day that is approximately 25% of the aquifer conductivity.

The two Central Wire extraction wells are located at the intersection of [redacted]. Each well is modeled to discharge water for 365 days a year at 300 gallons per minute. The Central Sod irrigation well is only run for 6 months of the year at a rate of 1750 gallons per minute. The small irrigation well located to the northeast also extracts water for 6 months of the year at a rate of 50 gallon per minute.

A uniform recharge was added over the whole site. Recharge was set at 2.20 inches per year for the entire site.

3.5 LAYER PROPERTIES

Layer properties were generalized and assigned to the entire model. Layer properties included values for hydraulic conductivity, porosity and storage parameters. The porosity was assumed to be 0.30. Specific storage was assigned a value of 0.0001 and specific yield was assigned a value of 0.27. The initial hydraulic conductivity used in the model was 14 feet per day; however, conductivity values were adjusted during the calibration process and the final conductivity ended at 18.2 feet per day.

SECTION 4

SOFTWARE SELECTION

MODFLOW - 2000 was selected as the numerical groundwater flow model, and MT3D was selected as the particle transport program. These models were all utilized inside of Processing Modflow, which is a graphic user interface for many groundwater flow and reactive transport models and allows for the development of a digital CSM.

SECTION 5

MODEL CALIBRATION

After creating a steady state groundwater flow model inside of MODFLOW – 2000 without well effects, the model was calibrated as a transient model to match observed hydraulic heads with well effects. The calibration was accomplished by minimizing the variance of well heads in the scatter graph (Figure 3). The calibrated parameters included boundary conditions and hydraulic conductivity. The calibration process involves varying input parameters, such as hydraulic conductivity, and repeatedly running the model until the residual error between observed and computed hydraulic head and fluxes are within an acceptable level of accuracy.

5.1 <u>OBSERVATION FILES</u>

A plan view of the site from InteGreyted Consultants dated July 2001 has the most complete set of hydraulic head measurements (Attachment 3) due to the data only being on-site. A well log for permit number G-6763 dated February 2002 was used as a downgradient head data point (Attachment 2).

Streamflow data was not available for any of the rivers that affect the groundwater flow. It has been assumed that the streambed material has a hydraulic conductivity of 4.75 ft/day, has a constant water depth of 0.5 feet and a constant streambed material thickness of 4 feet. Assuming a stream width of 40 feet and by utilizing Manning s equation a stream velocity of 1.41 feet per second is calculated. This will create a stream flow rate of approximately 28.2 cubic feet per second.

Utilizing the equation: Q = KIA, where K equals hydraulic conductivity, I equals the horizontal hydraulic groundwater gradient, and A equals the cross-sectional area of the aquifer, one can estimate the groundwater flux within the aquifer. If K equals 18.2 feet per day, I equals 0.0017 and a conservative estimate on the cross-sectional area is 6, 000 feet wide x 100 feet thick, then one arrives at a calculated overall aquifer flux of 18,600 cubic feet per day or 0.22 cubic feet per second. By comparing flow rates it suggests that the streams are not gaining from the groundwater.

5.2 CALIBRATED PARAMETERS

Resulting from the calibration process, the hydraulic conductivity and the river levels were adjusted to promote convergence of observed hydraulic heads. The river heads range from an upstream level of 830 feet to a downstream level of 815 feet. The hydraulic conductivity values for loamy sand vary from 10 to 40 feet per day

5.3 CALIBRATION RESULTS

The results of the calibration indicated an excellent fit between simulated and observed hydraulic heads (Figure 3). With the minimal amount of stream data, soil property data and actual hydraulic heads the model shows a close relationship between actual hydraulic heads and modeled hydraulic heads. The hydraulic conductivity at 18.2 feet per day is within the range of 10 to 40 feet per day.

SECTION 6

PREDICTIVE SIMULATIONS

Predictive simulations were created that evaluated the fate and transport of the current chlorine plume. These simulations were conducted using MT3D. For the purpose of a worst case scenario the contamination plume was modeled as Total Chlorine. Data for the contamination plume was taken from the 2006 groundwater sampling event and the February 2007 Geoprobe sampling event.

For simplification advection, dispersion and 1st order decay were considered as the main contributing factors for fate and transport of the plume. It was also assumed that there will be no sorption of the contaminant to the soil. The dispersivity was assumed to be 33%. This can be calculated by using the initial plume width vs. length. The initial plume has a width of approximately 3000 feet and a length of approximately 6000 feet. The range of half-life's for chlorinated solvents range from 0.5 years for PCE to 60 years for DCA, as a worst case scenario a the half-life of 60 years has been used.

6.1 PREDICTIVE SIMULATION RESULTS

The major contingent of the contamination plume is still located within the capture zone of the Central Wire extraction wells. The leading edge that has escaped the capture zone is located in an area of relatively stagnant water. The leading edge of the contamination plume moves only approximately 500 feet.

During pumping operation the gradient is considerably raised causing the plume to migrate the most during this period. The leading edge even in a pumping cycle remains in a semi-stagnant area for groundwater due to the extraction wells and irrigation wells competing against each other. With a 60 year half life and due to effects of dispersion, the leading edge of the plume falls below remediation goals within 500 feet of the initial leading edge.

During the period when the irrigation wells are not pumping the Central Wire extraction wells have the main affect to the contamination plume. These two wells keep the leading edge of the plume stagnant and continue to extract contamination from the rest of the contamination plume.

Hydraulic heads during periods when irrigation pumps are not discharging and when irrigation pumps are discharging are illustrated in Figure 4 and 5.

Fate and transport of the Total Chorine plume for up to 60 years are illustrated in Figures 6 through 13.

SECTION 7

SENSITIVITY ANALYSES

A sensitivity analyses was completed to identify the groundwater flow model's sensitivity to uncertainty in values of model input parameters and how these parameters may affect the simulated groundwater gradient. The base model used in the sensitivity analyses was the simulation that incorporated the river properties and four extraction wells. Parameters that were evaluated during this exercise included hydraulic conductivity and recharge.

7.1 HYDRAULIC CONDUCTIVITY

this is a note with K.

A model iteration was completed using a constant hydraulic conductivity value of1000 feet per day for the model domain. The results of this simulation indicated that, the higher the conductivity, the less effective the extraction pumps will have on the contamination plume. Also, by increasing the conductivity, the contamination plume moves purely by advection, eliminating the effects of dispersion and decay. The plume proceeds quickly down gradient with little change in form.

Figures illustrating the hydraulic heads for this simulation are provided as Figures 14 and 15

7.2 RECHARGE

The model's sensitivity to recharge was evaluated by assigning recharge across the model domain equal to 1 foot per year (0.0028 ft/day). The simulation indicates by increasing the amount of infiltration to the groundwater appears to increase the effects of dispersion to the plume, creating a pancake effect and lowering the effectiveness of the extraction wells.

Figures illustrating the hydraulic heads for the simulation are provided as Figures 16 and 17. Figure illustrating effects on contamination plume at 60 years are provided as Figure 18.

7.3 RESULTS

The results of the sensitivity analyses indicate that the fate and transport of the contamination plume is sensitive to variations in hydraulic conductivity and recharge rates. Ultimately, the migration of the contamination plume and effectiveness of the extraction wells is based on the hydraulic conductivity of the aquifer. As the hydraulic conductivity is increased, the effects from advection are predominant and the effects of dispersion and decay are incidental. With the information currently provided there is not any reason to believe that the conductivity will change greatly from the simulated conductivity.

With the increase of the recharge to the aquifer advection did not seem to be greatly affected, though dispersion in the transverse was increased.

SECTION 8

CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSIONS

The model results suggest the following:

Due to the hydrogeological characteristics of the study area, the contamination plume is not expected to migrate far past its current location. Existing extraction wells will continue to remediate with in their intended capture zones. Any contamination that has bypassed the capture zones of the Central Wire extraction wells will either decay or disperse below remediation goals within approximately 500 feet of the current leading edge of the plume. This transport will not affect any other extraction wells in the area.

8.2 RECOMMENDATIONS

Several recommendations have resulted from this work, including the following:

Central Wire should continue their bi-annual sampling of existing monitoring wells. This will assist in the evaluating the selected remedy of the downgradient end of the chlorine plume, i.e., Monitored Natural Attenuation, by continuing to providing information on the effectiveness of the existing engineering controls and will provide necessary information to determine when remediation goals have been achieved.

It is also suggested that Central Wire install additional monitoring wells in the MNA area. These will provide information on amounts of electron donors (typically organic carbons) needed for the Reductive Dechlorination process, monitor any plume migration, determine the effectiveness of the reductive dechlorination process, and will subsequently assist in the determination of when remediation objectives have been achieved.

REFERENCES

The following documents were used in the preparation of the groundwater modeling and creation of this document.

Chiang, Wen-Hsing. 3D-Groundwater Modeling with PMWIN. Berlin: Springer, 2005.

NRCS Soil Data Mart. US Department of Agriculture. http://soildatamart.nrcs.usda.gov.

Terraserver-USA. United States Geological Society. http://www.terraserver-usa.com/.

Todd, David K., and Mays, Larry W. Groundwater Hydrology. Wiley & Sons, Inc., 2005.

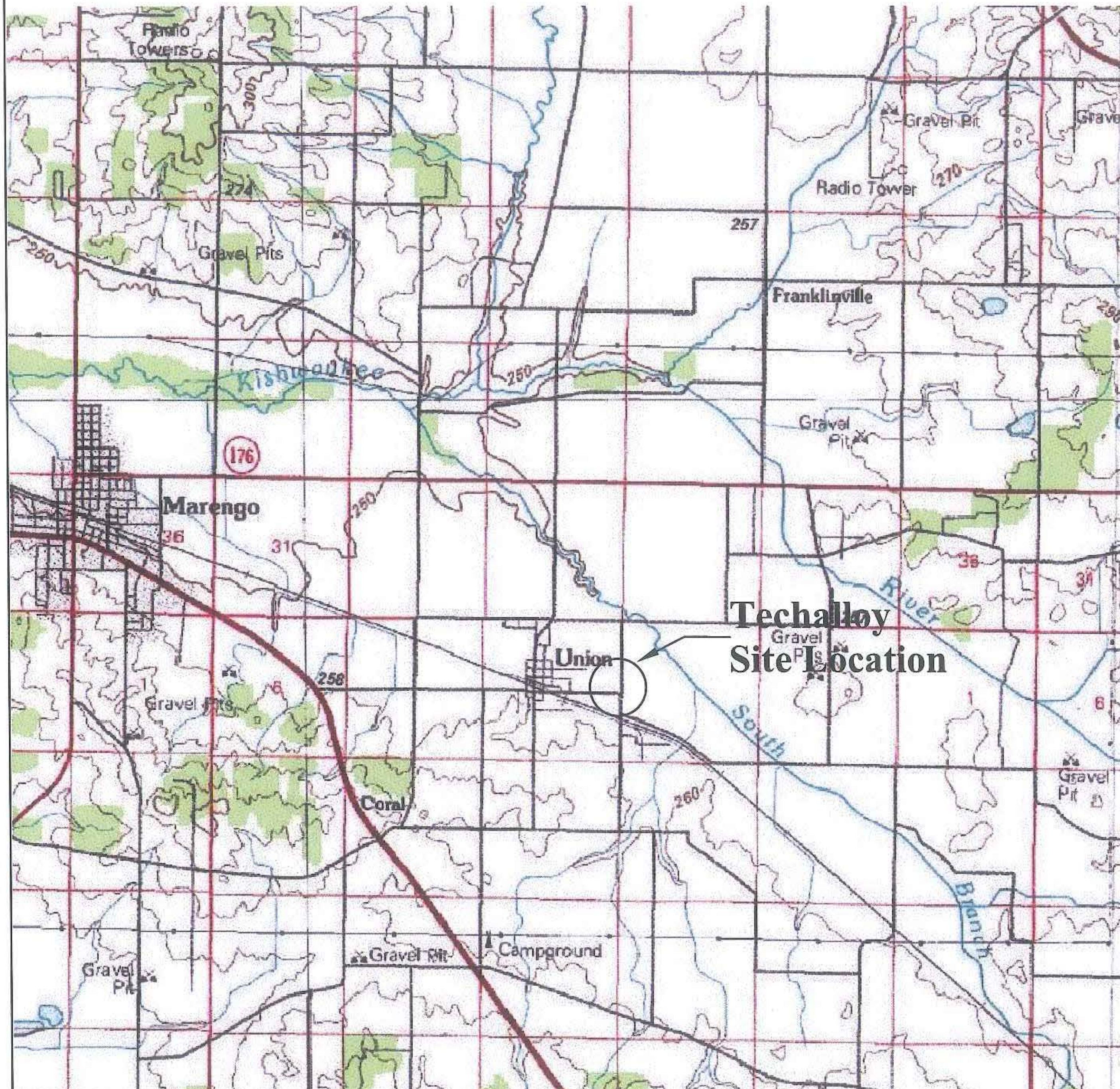


Figure 1: Site Location

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

SIZE	FSCM NO.	DWG NO.	REV

SCALE	Drawn By: SFG	SHEET

Non-responsive

[redacted]

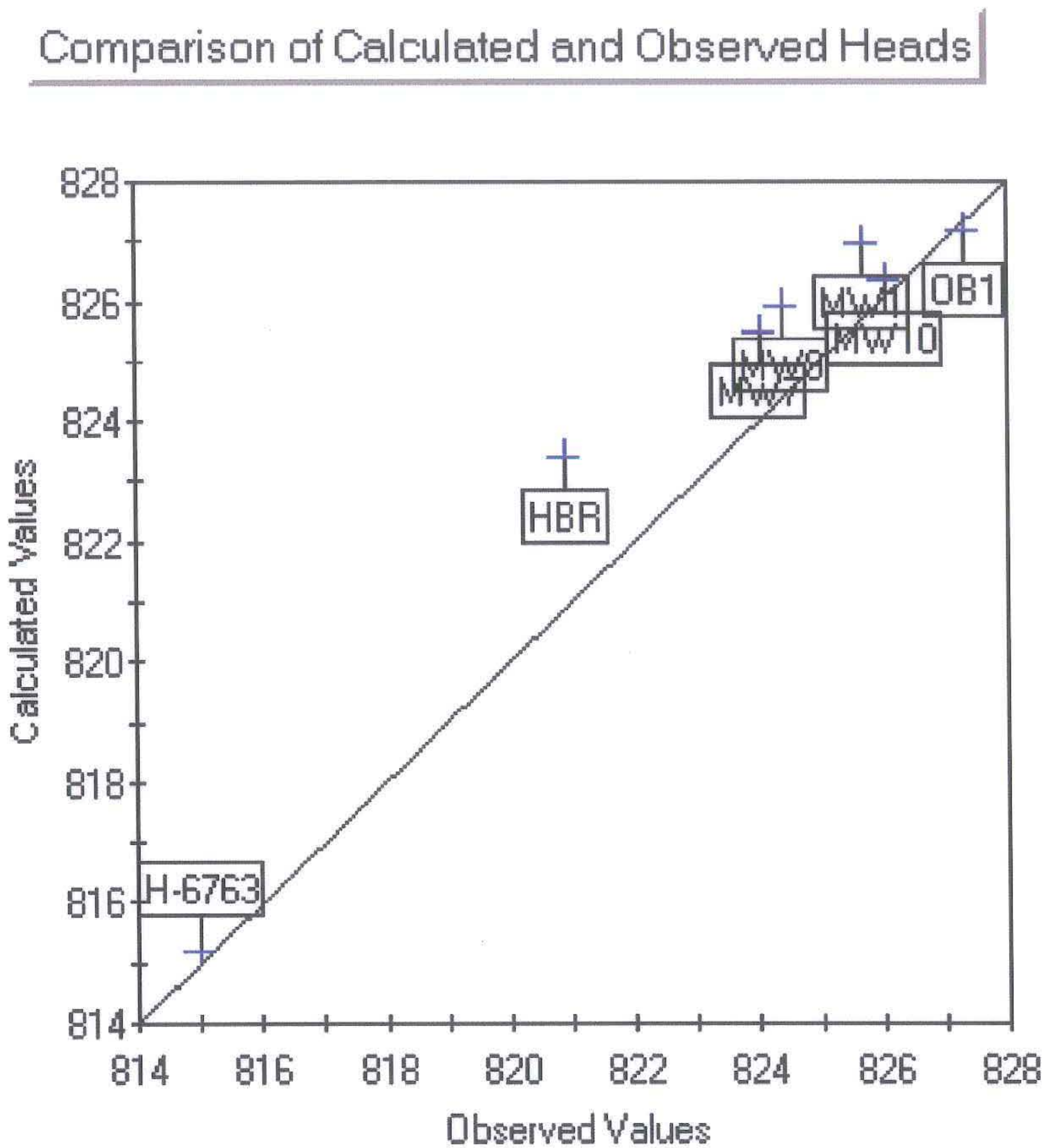


Figure 3: Head Scatter Diagram

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

11/08/2007

None

Drawn By: SFG

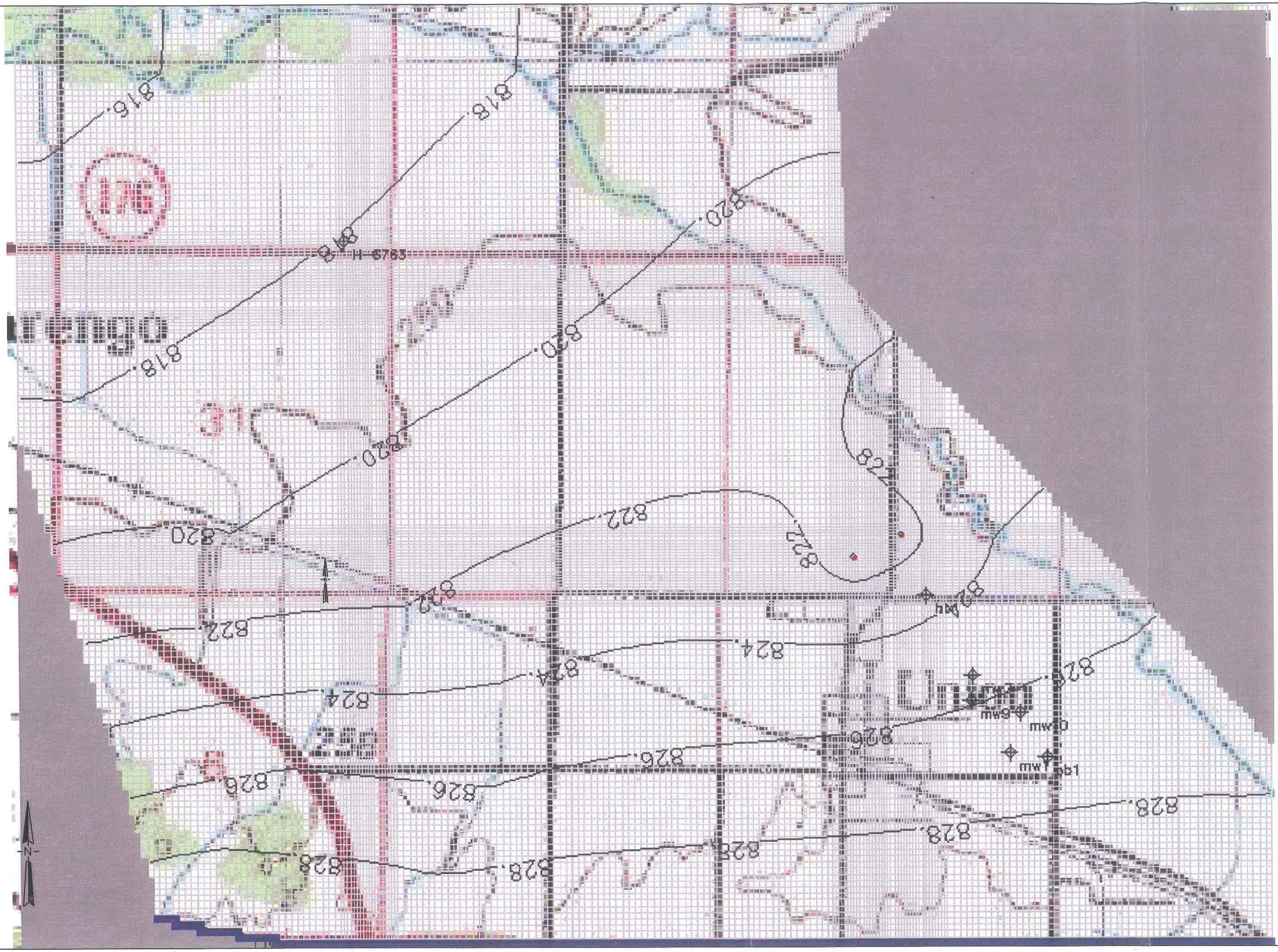


Figure 4

where are mw points & boundaries! where is key! where are mw. wells?

Groundwater Head without Irrigation Pumps

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Techalloy Company, Inc.	
11/08/2007	
1" ≈ 1457'	

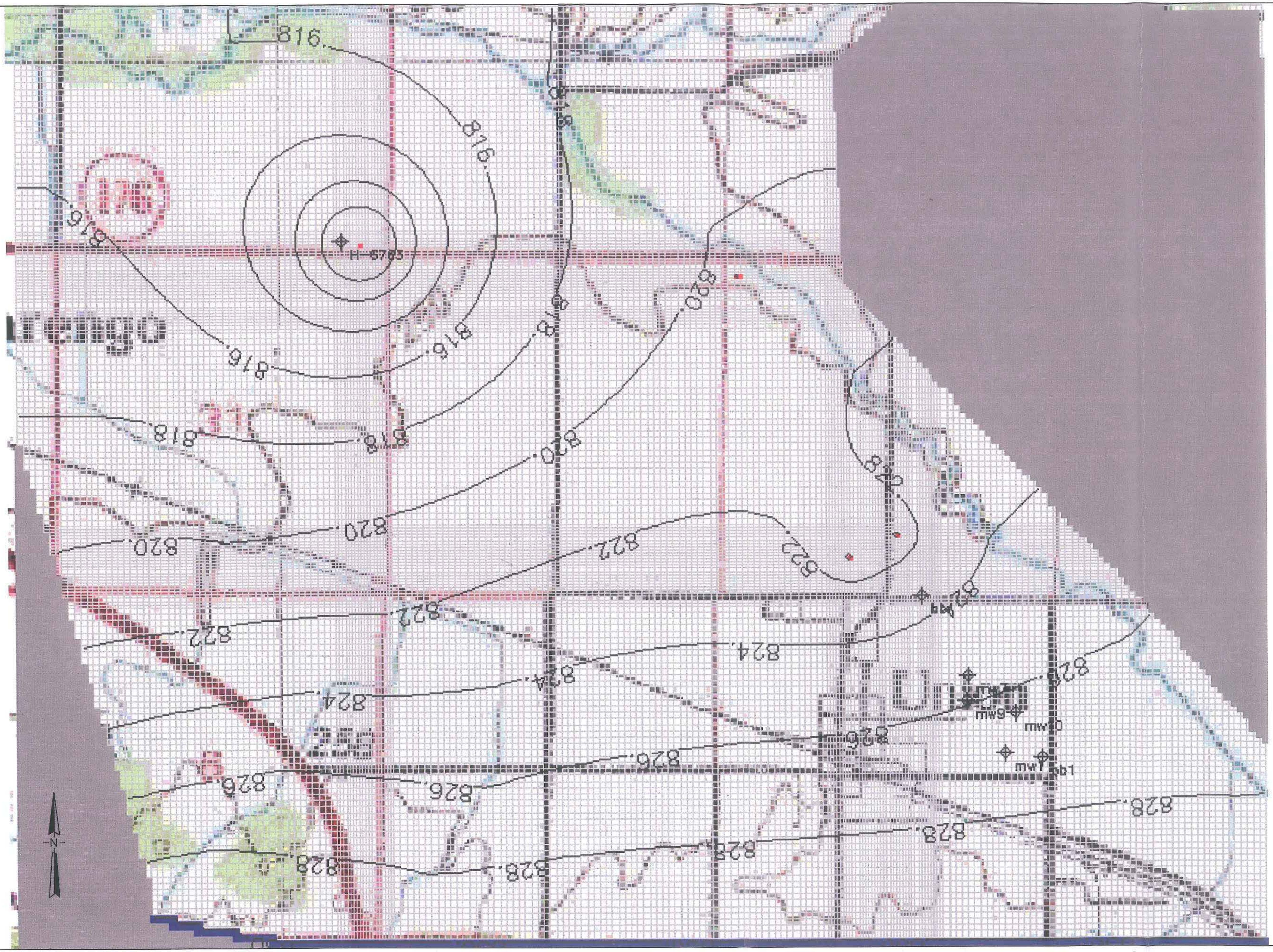


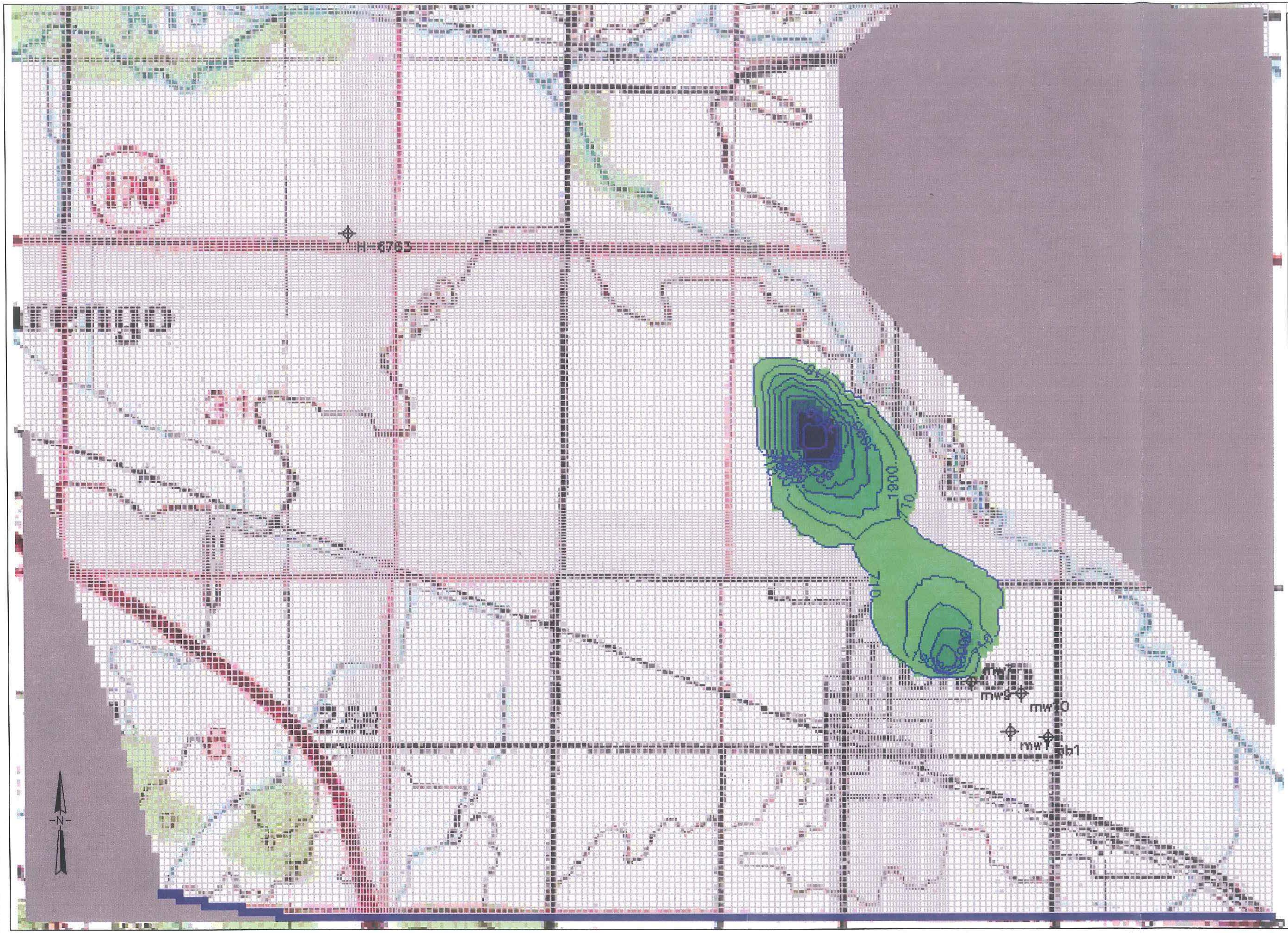
Figure 5

Groundwater Head with Irrigation Pumps

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Techalloy Company, Inc.
11/08/2007
1" ≈ 1457'



General Notes

Concentrations are reported in ug/ft3

Figure 6

No.	Revision/Issue	Date
	Total Chlorine 5 years	

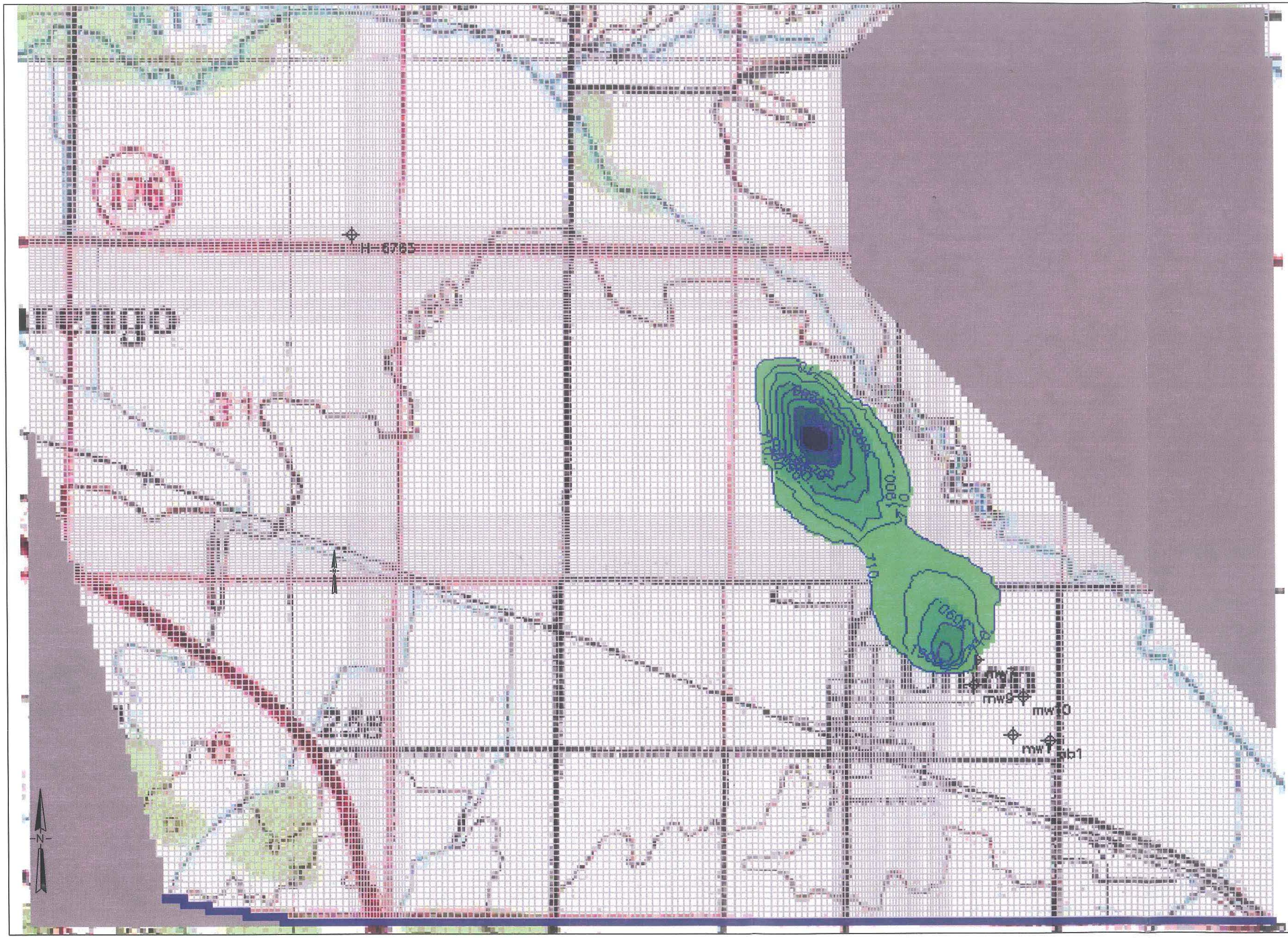
Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project: Techalloy Company, Inc.
Sheet:
Date: 11/12/2007
Scale: 1" ≈ 1457'



General Notes

Concentrations are reported in ug/ft3

Figure 7

No.	Revision/Issue	Date
	Total Chlorine 10 years	

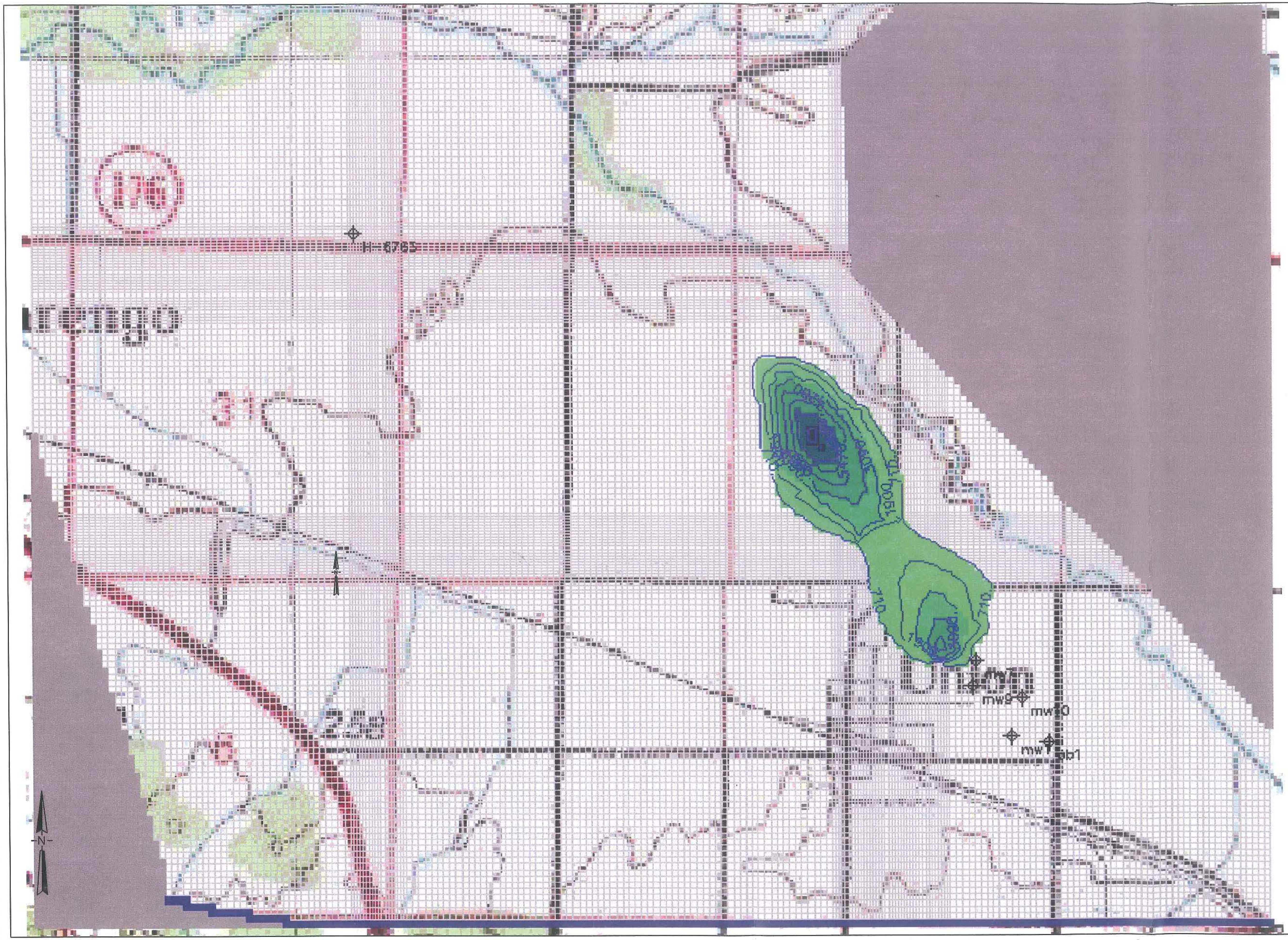
Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project	Sheet
Techalloy Company, Inc.	
Date: 11/12/2007	
Scale: 1" ≈ 1457'	



General Notes

Concentrations are reported in ug/ft3

Figure 8

	Total Chlorine 15 years	
No.	Revision/Issue	Date

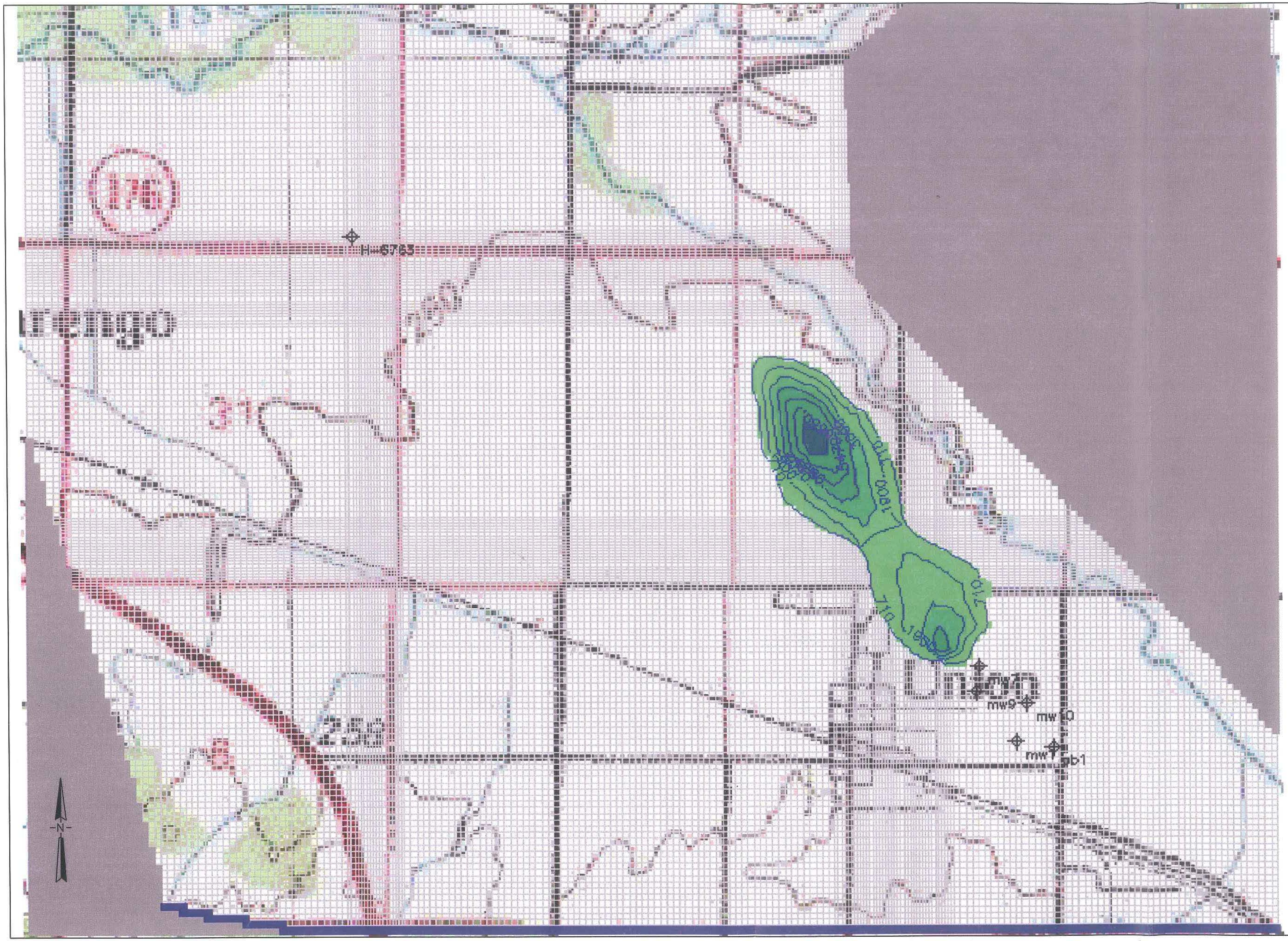
Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project Techalloy Company, Inc.	Sheet
Date 11/12/2007	
Scale 1" ≈ 1457'	



General Notes

Concentrations are reported in ug/ft3

Figure 9

Total Chlorine 20 years

No.	Revision/Issue	Date

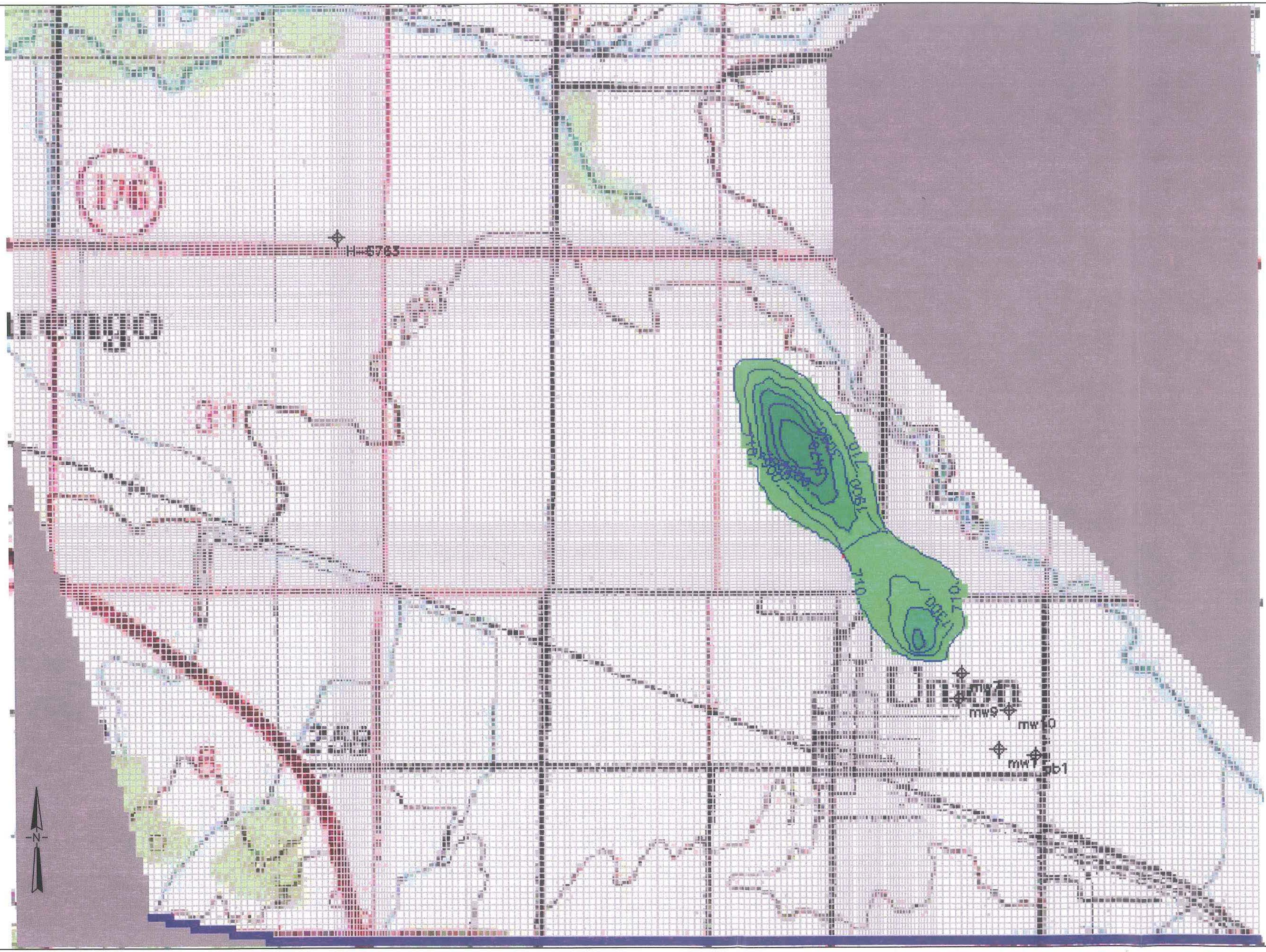
Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project	Sheet
Techalloy Company, Inc.	
Date 11/12/2007	
Scale 1" ≈ 1457'	



General Notes

Concentrations are reported in ug/ft3

Figure 10

No.	Revision/Issue	Date
	Total Chlorine 25 years	

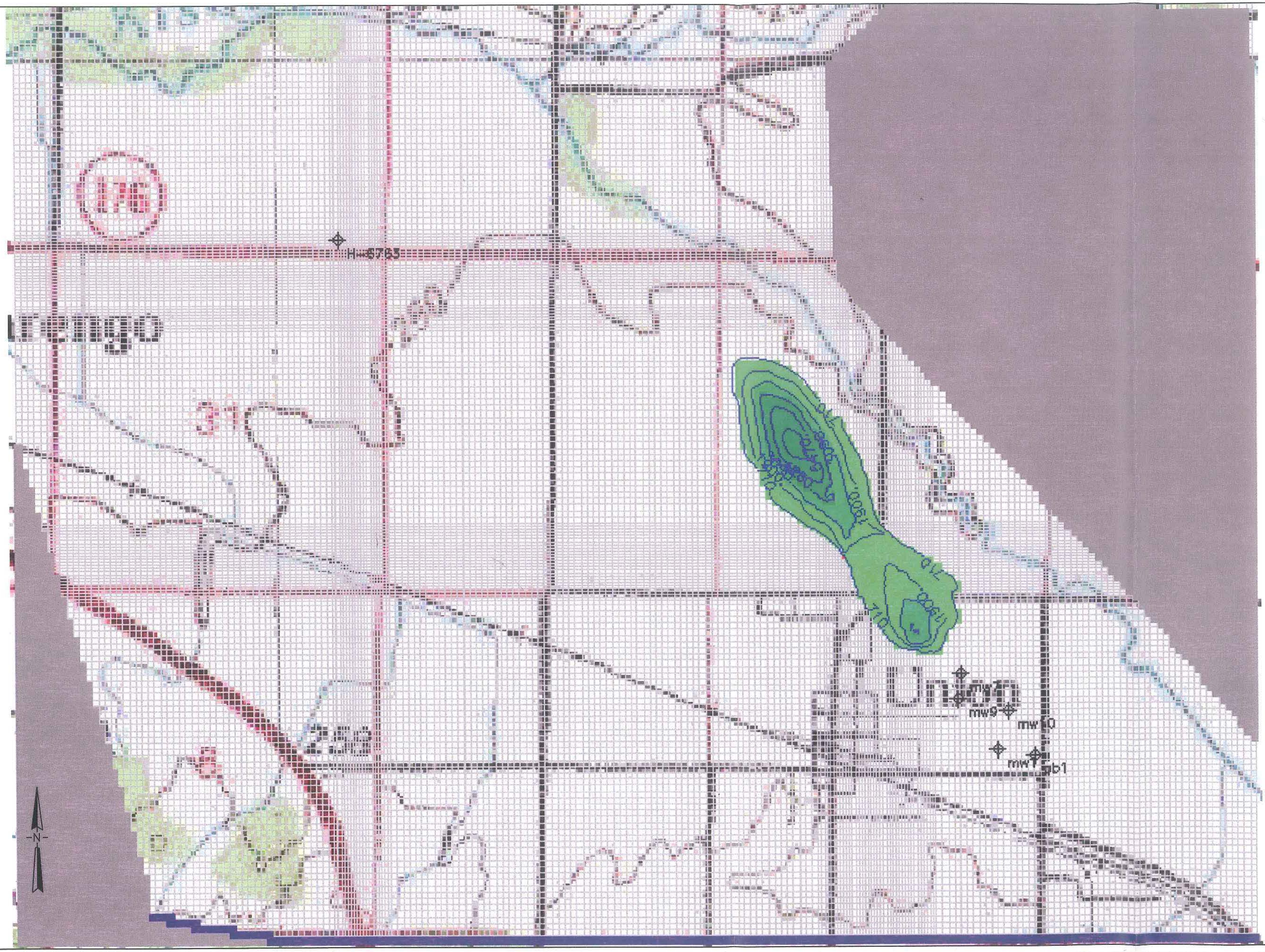
Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project: Techalloy Company, Inc.	Sheet
Date: 11/08/2007	
Scale: 1" ≈ 1457'	



General Notes

Concentrations are reported in ug/l13

Figure 11

Total Chlorine 30 years

No.	Revision/Issue	Date

Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

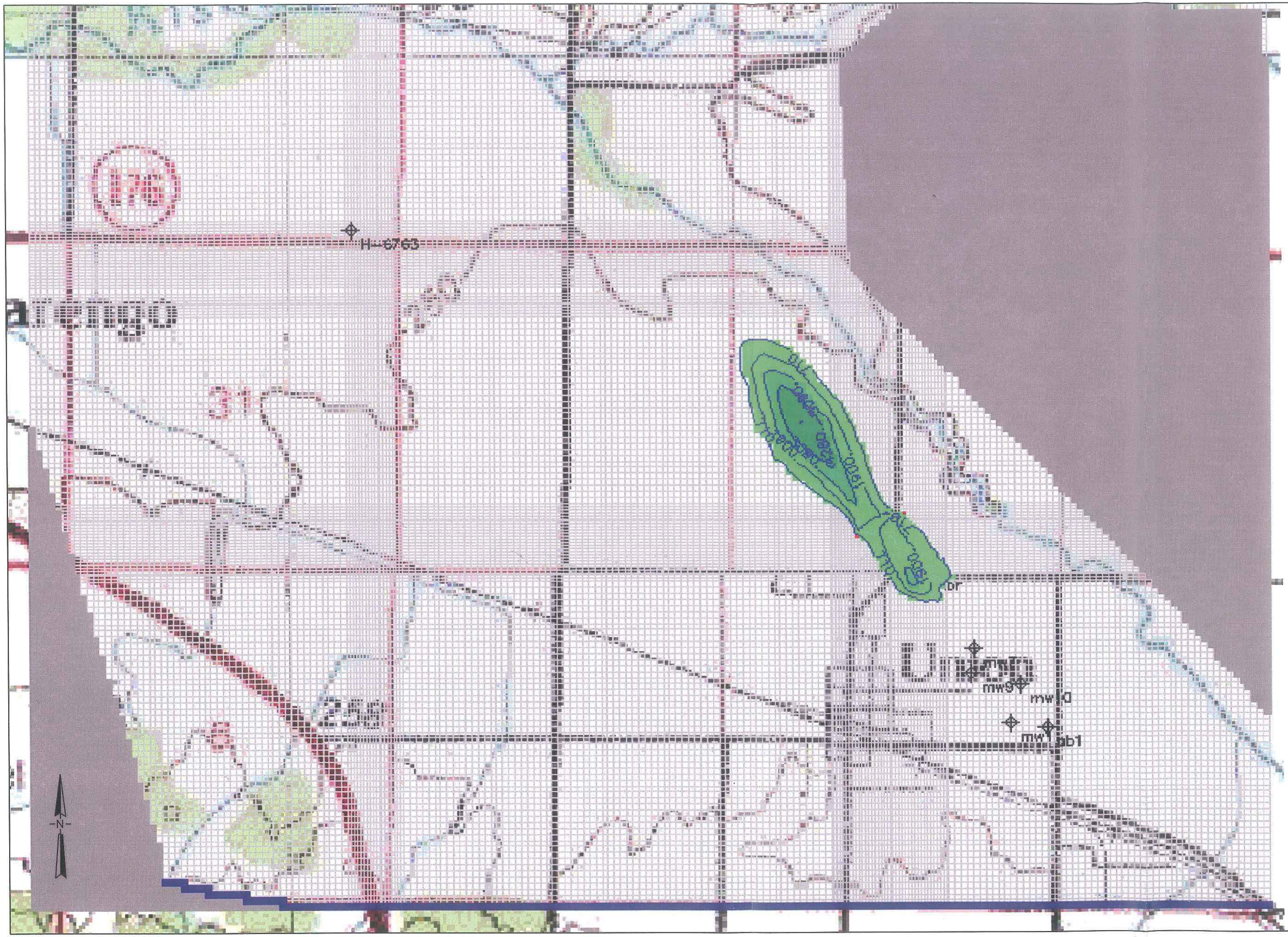
Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project: Techalloy Company, Inc.

Sheet

Date: 11/08/2007

Scale: 1" ≈ 1457'



General Notes

Concentrations are reported in ug/ft3

Figure 12

No.	Revision/Issue	Date
	Total Chlorine 45 years	

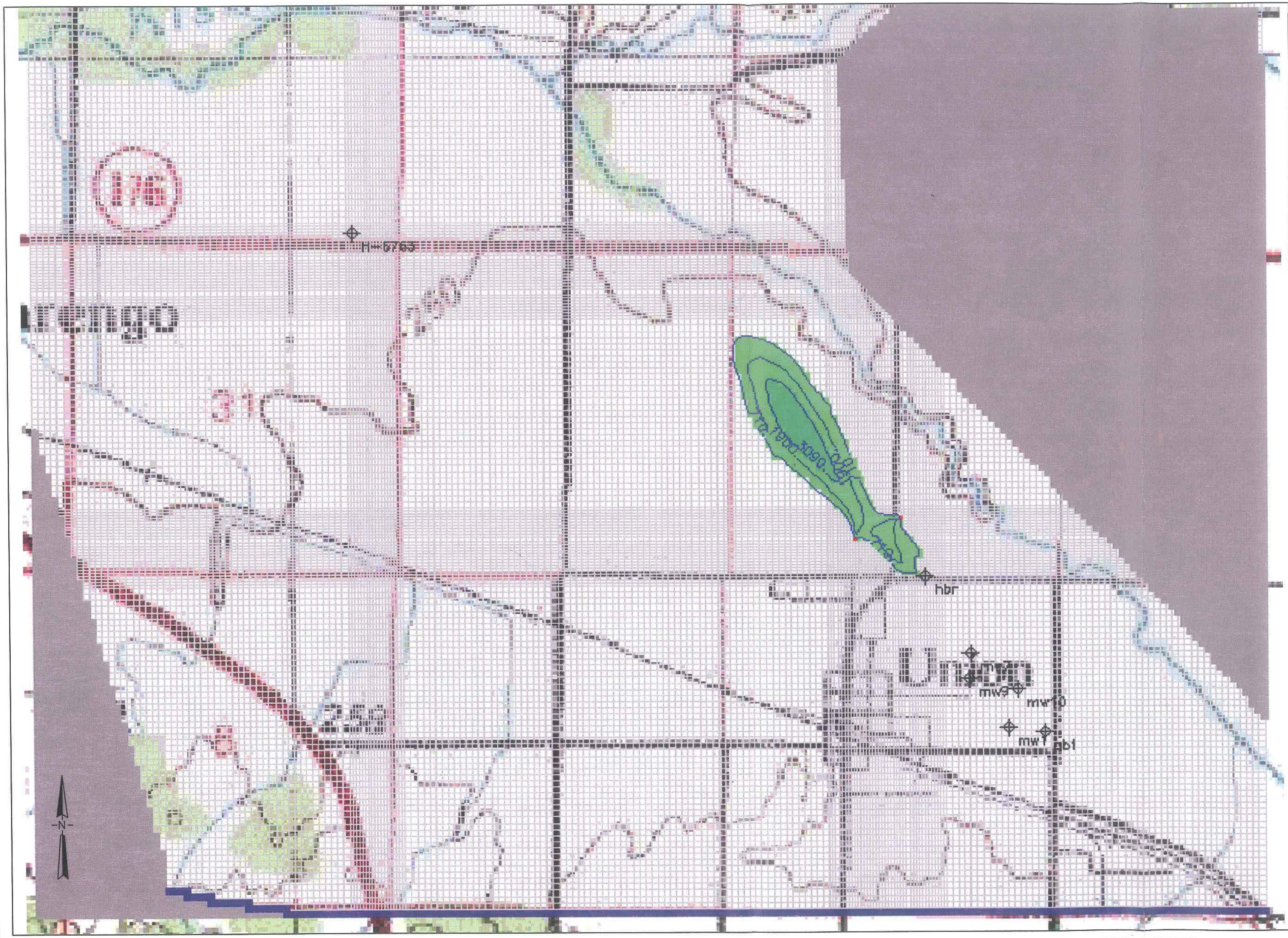
Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project	Sheet
Techalloy Company, Inc.	
Date: 11/08/2007	
Scale: 1" ≈ 1457'	



General Notes

Concentrations are reported in ug/ft3

Figure 13

No.	Revision/Issue	Date
	Total Chlorine 25 years	

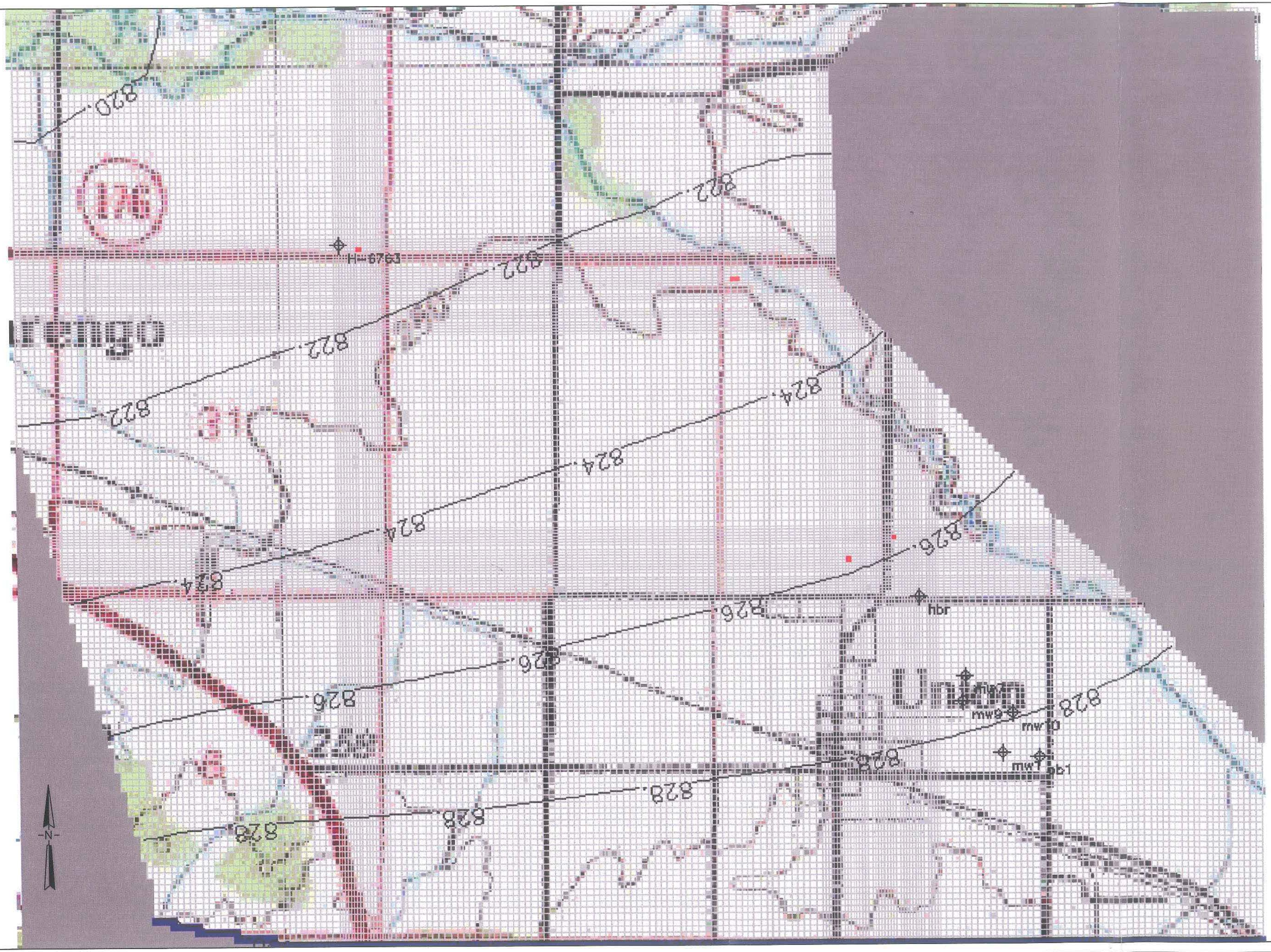
Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project: Techalloy Company, Inc.
Date: 11/08/2007
Scale: 1" ≈ 1457'
Sheet



General Notes

Figure 14

	Sensitivity Analysis - Raised Conductivity w/ Pumps	
No.	Revision/Issue	Date

Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project: Techalloy Company, Inc.

Sheet

Date: 01/07/2008

Scale: 1" = 1457'

General Notes

Figure 15

Sensitivity Analysis - Raised Conductivity w/ Pumps

No.	Revision/Issue	Date

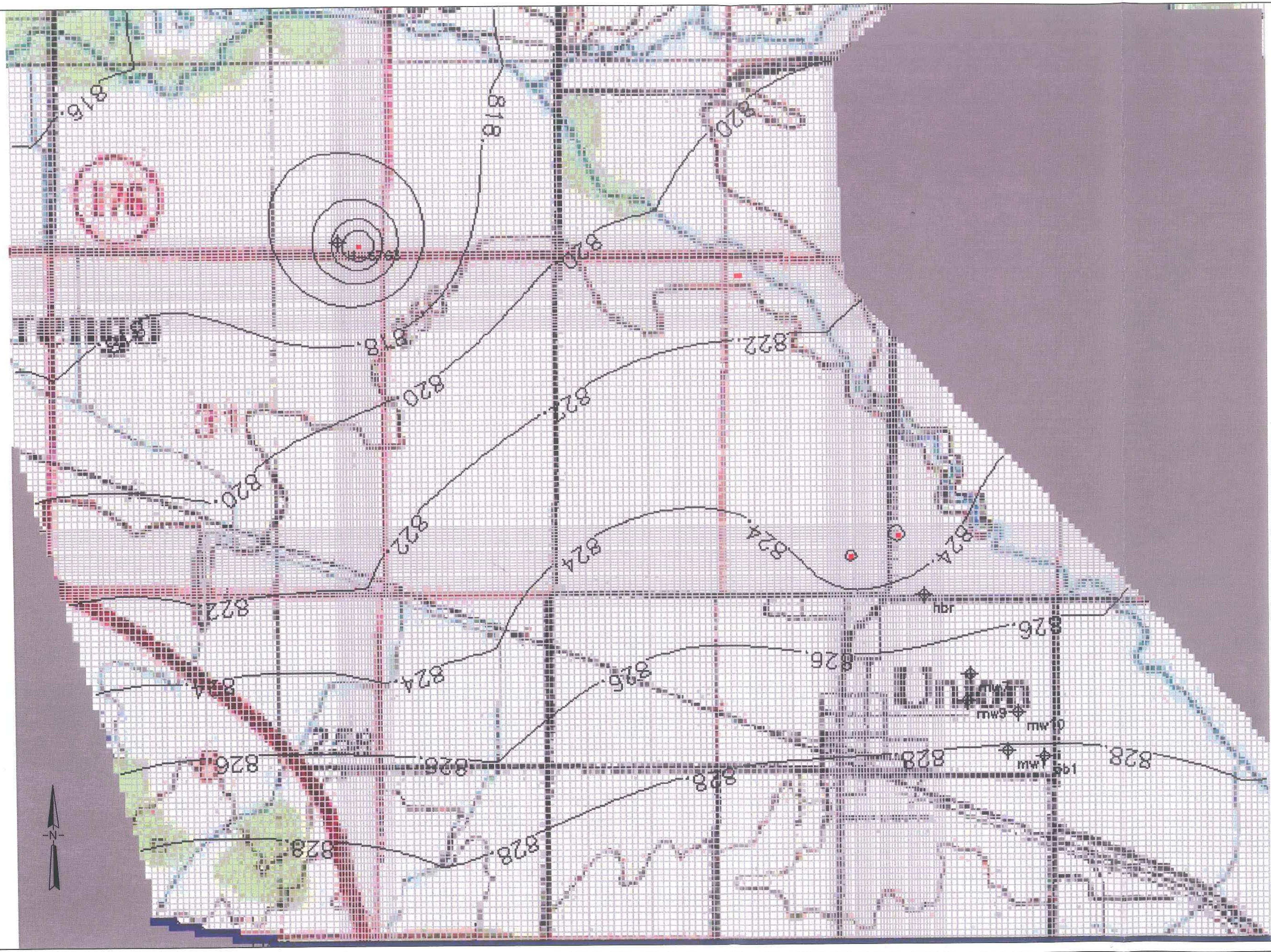
Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project	Sheet
Techalloy Company, Inc.	
Date 01/07/2008	
Scale 1" = 1457'	



General Notes

Figure 16

Sensitivity w/ Pumps - Rainfall Intensity

No.	Revision/Issue	Date

Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

TECHALLOY

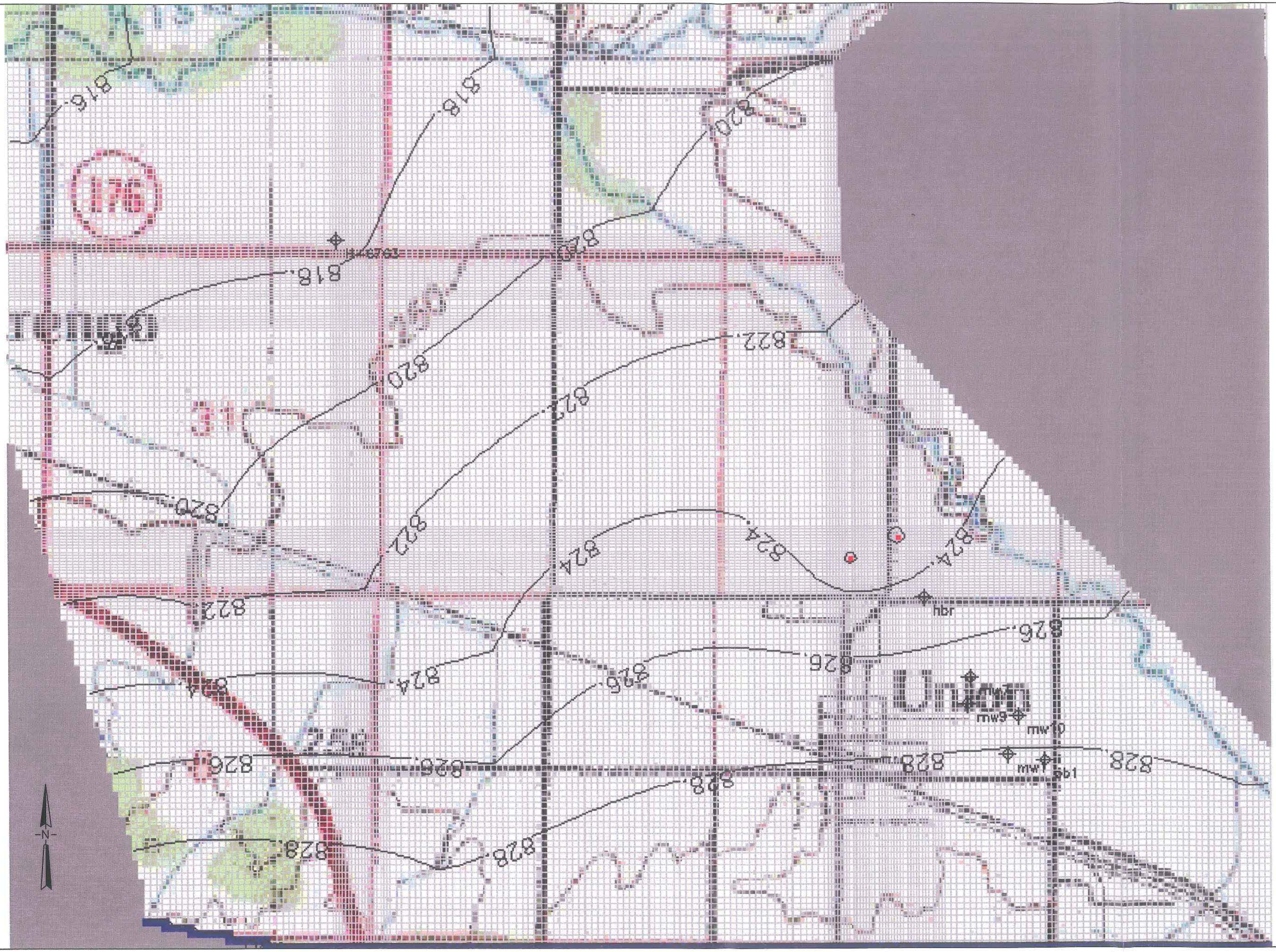
Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project: Techalloy Company, Inc.

Sheet

Date: 01/07/2008

Scale: 1" = 1457'



General Notes

Figure 17

Sensitivity w/o Pumps - Rainfall Intensity

No.	Revision/Issue	Date

Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

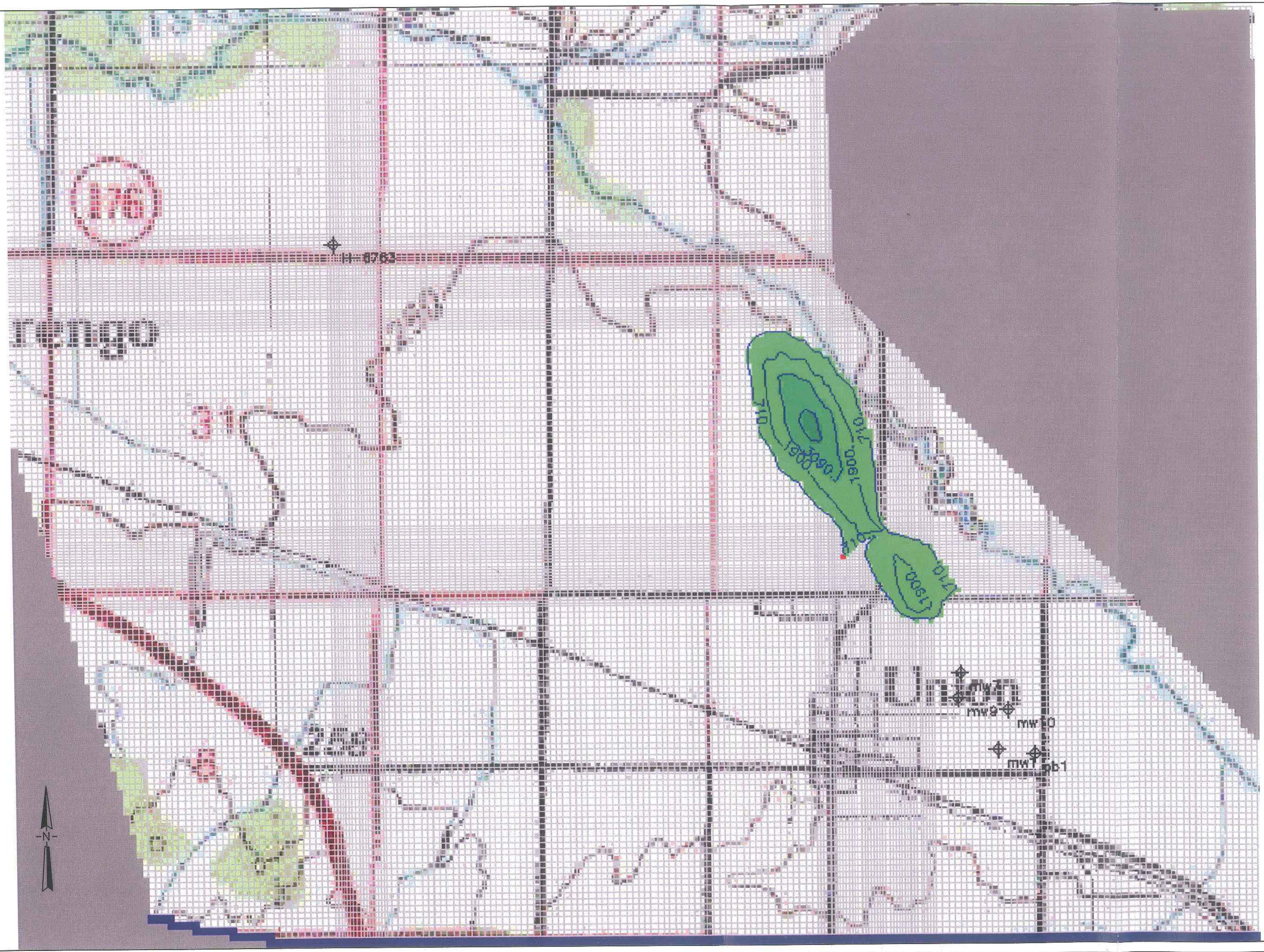
Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project: Techalloy Company, Inc.

Sheet

Date: 01/07/2008

Scale: 1" = 1457'



General Notes

Concentrations are reported in ug/ft3

Figure 18

	Sensitivity - Rainfall Intensity	
	Total Chlorine 60 years	
No.	Revision/Issue	Date

Firm Name and Address

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

Project Name and Address

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

Project: Techalloy Company, Inc.
Date: 01/07/2008
Scale: 1" ≈ 1457'
Sheet

ATTACHMENT 1

NRCS SOIL DATA

Non-responsive

[redacted]

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: McHenry County, Illinois
Survey Area Data: Version 6, Dec 29, 2006

Date(s) aerial images were photographed: 1988; 1998

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

McHenry County, Illinois (IL111)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
87A	Dickinson sandy loam, 0 to 2 percent slopes	288.7	20.2%
149A	Brenton silt loam, 0 to 2 percent slopes	1.3	0.1%
221B	Parr silt loam, 2 to 5 percent slopes	0.2	0.0%
290A	Warsaw loam, 0 to 2 percent slopes	49.2	3.4%
290B	Warsaw loam, 2 to 4 percent slopes	19.6	1.4%
290C2	Warsaw loam, 4 to 6 percent slopes, eroded	2.4	0.2%
329A	Will loam, 0 to 2 percent slopes	102.5	7.2%
330A	Peotone silty clay loam, 0 to 2 percent slopes	2.1	0.1%
379A	Dakota loam, 0 to 2 percent slopes	849.7	59.3%
379B	Dakota loam, 2 to 4 percent slopes	0.1	0.0%
528A	Lahoguess loam, 0 to 2 percent slopes	80.5	5.6%
529A	Selmass loam, 0 to 2 percent slopes	13.9	1.0%
1206A	Thorp silt loam, 0 to 2 percent slopes, undrained	1.4	0.1%
8776A	Comfrey loam, 0 to 2 percent slopes, occasionally flooded	20.7	1.4%
Totals for Area of Interest (AOI)		1,432.3	100.0%

Map Unit Description (Brief, Generated)

McHenry County, Illinois

[Minor map unit components are excluded from this report]

Map unit: 87A - Dickinson sandy loam, 0 to 2 percent slopes

Component: Dickinson (88%)

The Dickinson component makes up 88 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3s. This soil does not meet hydric criteria.

Map unit: 329A - Will loam, 0 to 2 percent slopes

Component: Will (85%)

The Will component makes up 85 percent of the map unit. Slopes are 0 to 2 percent. This component is on flats. The parent material consists of Loamy drifts over sandy and gravelly deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 9 inches during February, March, April, May, June. Organic matter content in the surface horizon is about 6 percent. Nonirrigated land capability classification is 2w. This soil meets hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 25 percent.

Map unit: 379A - Dakota loam, 0 to 2 percent slopes

Component: Dakota (88%)

The Dakota component makes up 88 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of Loamy and sandy outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is moderate. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2s. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 8 percent.

Map unit: 528A - Lahoguess loam, 0 to 2 percent slopes

Component: Lahoguess (90%)

The Lahoguess component makes up 90 percent of the map unit. Slopes are 0 to 2 percent. This component is on outwash plains. The parent material consists of outwash. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 18 inches during January, February, March, April, May. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 1. This soil does not meet hydric criteria.

ATTACHMENT 2

SOIL BORING AND
WELL CONSTRUCTION LOGS

Table 2-2

Significant Construction Information of Monitoring Wells at Techalloy RFI Study Techalloy Company, Inc. Union, Illinois

Well I.D.	Date Installed	Depth (bgs) ft	Screened Interval	Construction Material
MW-1	January 1990	14.0	4-14	2"-PVC
MW-2	January 1990	15.0	5-15	2"-PVC
MW-3D	January 1990	115.5	104-114	2"-PVC
MW-4	January 1990	14.0	4-14	2"-PVC
MW-5	March 1990	38.5	27-37	2"-PVC
MW-5D	March 1990	90.0	74-84	2"-S.St
MW-6	March 1990	20.0	10-20	2"-PVC
MW-7	March 1990	26.0	16-26	2"-PVC
MW-8	March 1990	26.0	16-26	2"-PVC
MW-9	March 1990	28.0	16-26	2"-PVC
MW-10	July 1992	16.0	6-16	2"-PVC
MW-11	July 1992	16.0	6-16	2"-PVC
MW-IIBR	August 1990	35.0	17-27	2"-PVC
OBS-W	February 1992	41.0	18-38	2"-PVC
PTW-1	February 1992	39.0	29-39	6"-PVC

bgs = below ground surface
ft = feet
PVC = Poly-Vinyl Chloride
S.St. = Stainless steel

WATER WELL CONSTRUCTION REPORT

Date [illegible]

TYPE OR PRESS FIRMLY WITH BLACK INK PEN. COMPLETE WITHIN 30 DAYS OF WELL COMPLETION AND SEND TO THE APPROPRIATE HEALTH DEPARTMENT.

1. Type of Well a. **Driven** Well Casing diam. ______in. Depth ________ft.

   b. **Bored** Well Buried Slab [ ] Yes [ ] No
   Hole Diameter _____in. to _______ft.; _____in. to_______ft.; _____in. to_______ft.

   c. **Drilled** Well **PVC** casing Formation packer set at depth of _______ft.
   Hole Diameter 9 in. to 56 ft. _____in. to_______ft. _____in. to_______ft.

Type of Grout	# of Bags	Grout Weight	From (ft.)	To (ft.)	Tremie Depth (ft.)
BAROLS	4	10.0	45	3	45

   d. **Drilled** Well **Steel** Casing- - - Mechanically Driven [ ] Yes [ ] No
   Hole Diameter _____in. to _______ft. _____in. to_______ft. _____in. to______ft.

Type of Grout	# of Bags	Grout Weight	From (ft.)	To (ft.)	Tremie Depth (ft.)

   e. Well finished within [x] Unconsolidated Materials [ ] Bedrock

f. Kind of Gravel Sand Pack	Grain Size/Supplier #	From (ft.)	To (ft.)
[illegible]		[illegible]	[illegible]

2. Well Use [x] Domestic [ ] Irrigation [ ] Commercial [ ] Livestock
   [ ] Monitoring [ ] Other
3. Date Well Completed 2/8/02 Well Disinfected [x] Yes [ ] No
   Driller's estimated well yield 20 gpm
4. Date Permanent Pump Installed 2/11/02
5. Pump Capacity 10 gpm Set at (depth) [illegible] ft.
6. Pitless Adapter Model and Manufacturer [illegible]
7. Well Cap Type and Manufacturer [illegible]
8. Pressure Tank Working Cycle 12 gals. Captive Air [x] Yes [ ] No
9. Pump System Disinfected [x] Yes [ ] No
10. Name of Pump Company Country Well & Pump, Inc.
11. Pump Installer Mark [illegible] License # [illegible]
12. [illegible] License # [illegible]
   Licensed Pump Contractor Signature

Illinois Department of Public Health
Division of Environmental Health
525 W. Jefferson St.
Springfield, IL 62761

DO NOT write on these lines

IMPORTANT NOTICE: This state agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Public Act 85-0863. **DISCLOSURE OF THIS INFORMATION IS MANDATORY.** This form has been approved by the Forms Management Center.

illegible no mw #1

GEOLOGICAL AND WATER SURVEY WELL RECORD

13. Property Owner [illegible] Const. Well # ________
14. Driller [illegible] License # 102-003209
15. Name of Drilling Co. [illegible] Well & Pump, Inc.
16. Permit No. G-6763 Date Issued 10/10/01
17. Date Drilling Started [illegible]
18. Well SITE address 10197 Route 176 [illegible]
19. Township Name [illegible] Land ID # ________
20. Subdivision Name ________ Lot # ________
21. Location a. County [illegible]
   b. Township [illegible] Range [illegible] Section 30
   c.______ Quarter ______Quarter ______ Quarter
   d. Coordinates ____________ Site Elevation _____ ft. (msl)

For Survey Use

22. Casings, Liners* and Screen Information

Diam. (in.)	Material	Joint	Slot Size	From (ft.)	To (ft.)
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	56

(*) ________________________________
(List reason for liner, type of upper and lower seals installed)

23. Water from gravel at a depth of 44 ft. to [illegible] ft.
a. Static water level 5 ft. below casing which is 12 in. above ground
b. Pumping level is 20 ft. pumping 19 gpm after pumping for 2 hours

24. Earth Materials Passed Through	From (ft.)	To (ft.)
Top Soil	0	2
Clay	2	5
Sand & Gravel	5	44
Gravel	44	56

(If **dry hole**, fill out log and indicate how hole was sealed.)

25. Licensed Water Well Contractor Signature ________ 102-003209 License Number

SEE REVERSE SIDE FOR ADDITIONAL INFORMATION)

Page 1 **ILLINOIS STATE GEOLOGICAL SURVEY**

Semi-Private Water Well	Top	Bottom	
topsoil TOPSOIL	0	2	0 – 2
brown clay BROWN CLAY	2	4	2 – 4
sand/gravel SAND / Gravel	4	57	4 – 57
brown stony clay BROWN STONY Clay	57	70	57 – 70
Total Depth		70	

Casing: 5" PVC from 0' to 50'
5" SS SCREEN from 50' to 54'
Screen: 4' of 5" diameter 20 slot
Grout: BENTONITE CHIPS from 0 to 8.
Grout: NATIVE from 8 to 54.
Water from sand/gravel at 50' to 54'.
Static level 6' below casing top which is 2' above GL
Pumping level 7' when pumping at 10 gpm for 3 hours
Permanent pump installed at 20' on March 22, 2000, with a capacity of 10 gpm

Address of well: same as above

Location source: Location from permit

Permit Date: March 16, 2000 Permit #:

COMPANY Keller, Larry
FARM Central Sod
DATE DRILLED March 21, 2000 NO.
ELEVATION 0 COUNTY NO. 37561
LOCATION SW SW SW
LATITUDE 42.255976 LONGITUDE -88.568318
COUNTY McHenry API 121113756100 29 - 44N - 6E

Central Sod
Farm Well

CASING – 5" PVC 0'-50'
SS. Screen – 5" — 50'-54'
Screen – 4' of 5" dia
20 slot

TO Jack
From Scott

Date	Sample Location	Depth	Time Setting Screen	Time	pH	Temp	Sample Time
2/19/07	GP-5S	19'	11:03 – 11:05	13:14	7.6	52°F	13:14
2/20/07	GP-5I	57'	8:05 – 8:10	8:26	8.0	43.5°F	8:48 & 9:00
				8:32	8.1	46.3°F	
				8:40	8.1	48.7°F	
				8:48	8.1	48.7°F	
2/20/07	GP-5D	84'	9:17 – 9:30	10:00	8.1	49.5°F	10:08
				10:04	7.7	51.1°F	
				10:08	7.7	51.1°F	
2/20/07	GP-4S	27'	10:50 – 10:52	11:02	8.0	52.7°F	11:12
				11:03	7.9	53.2°F	
				11:12	7.9	53.2°F	
2/20/07	GP-4I	57'	11:25 – 11:30	11:49	7.8	51.7°F	11:59
				11:51	7.8	52.2°F	
				11:59	7.8	52.3°F	
2/20/07	GP-4D	84'	13:05 – 13:15	13:35	8.2	52.2°F	13:50
				13:40	7.8	52.2°F	
				13:48	7.8	52.2°F	
2/20/07	GP-6D	84'	14:50 – 15:00	15:24	7.8	53.1°F	15:35
				15:27	7.7	53.0°F	
				15:35	7.7	53.0°F	
2/21/07	GP-6S	27'	8:06 – 8:10	8:25	7.9	49.4°F	8:32
				8:28	7.8	49.6°F	
				8:32	7.8	49.5°F	
2/21/07	GP-6I	57'	8:48 – 8:55	9:27	7.8	51.8°F	9:37
				9:29	7.7	51.9°F	
				9:31	7.6	52.0°F	
				9:37	7.6	52.0°F	
2/21/07	GP-3S	27'	10:30 – 10:35	10:52	7.9	52.7°F	11:00
				10:54	7.8	52.5°F	
				11:00	7.8	52.7°F	
2/21/07	GP-3I	57'	11:17 – 11:27	11:55	7.9	51.9°F	12:05
				11:58	7.8	51.4°F	
				11:59	7.7	51.4°F	
				12:05	7.7	51.4°F	
2/21/06	GP-3D	84'	13:35 – 13:50	14:18	8.0	52.5°F	14:30
				14:20	7.9	52.2°F	
				14:23	7.8	51.4°F	
				14:30	7.8	51.4°F	
2/21/07	Shop Well			15:20	7.3	51.0°F	15:20
2/21/07	GP-2D	84'	15:28 – 15:43	16:06	7.9	52.0°F	16:15
				16:08	7.8	51.8°F	
				16:15	7.8	51.8°F	
3/1/07	GP-2S	27'	9:30 – 9:32	10:15	7.7	51.7°F	10:22
				10:17	7.6	52.5°F	
				10:22	7.6	52.5°F	

3/1/07	GP-7S	27'	12:37 – 12:41	14:17	8.1	48.9°F	14:21
				14:19	8.0	49.5°F	
				14:21	8.0	49.5°F	
3/1/07	GP-7I	57'	12:11 – 12:19	13:55	7.5	50.8°F	14:00
				13:57	7.4	51.4°F	
				14:00	7.4	51.4°F	
3/1/07	GP-7D	84'	11:05 – 11:18	11:40	7.8	50.5°F	11:45
				11:42	7.9	50.6°F	
				11:45	7.9	50.6°F	

Residential Well Information and High Capacity Irrigation Well Locations
Union, Illinois

Owner of Residential Well	Depth of Well	Screened Interval	Address
Central Sod Well #1	Deep well- 70 Feet	40 to 70 Feet	Non-responsive [redacted]
Non-responsive [redacted]	Deep well - 85	?	[redacted]
[redacted]	Shallow well - 25		[redacted]
[redacted]	Shallow well		[redacted]
[redacted]	Shallow well		[redacted]
[redacted]	Shallow Well		[redacted]
[redacted]	Intermediate well 50 feet		[redacted]
[redacted]	Shallow well – 30 feet		[redacted]
[redacted]	Deep well – 90 feet		[redacted]
[redacted]			

Shallow well -10 feet to 30 feet
Intermediate well – 30 feet to 60 feet
Deep well – 60 feet to 90 feet

ATTACHMENT 3

CROSS-SECTIONS

N

Matrix Environmental Inc.
1880 W Winchester Rd Suite 111
Libertyville, IL. 60048

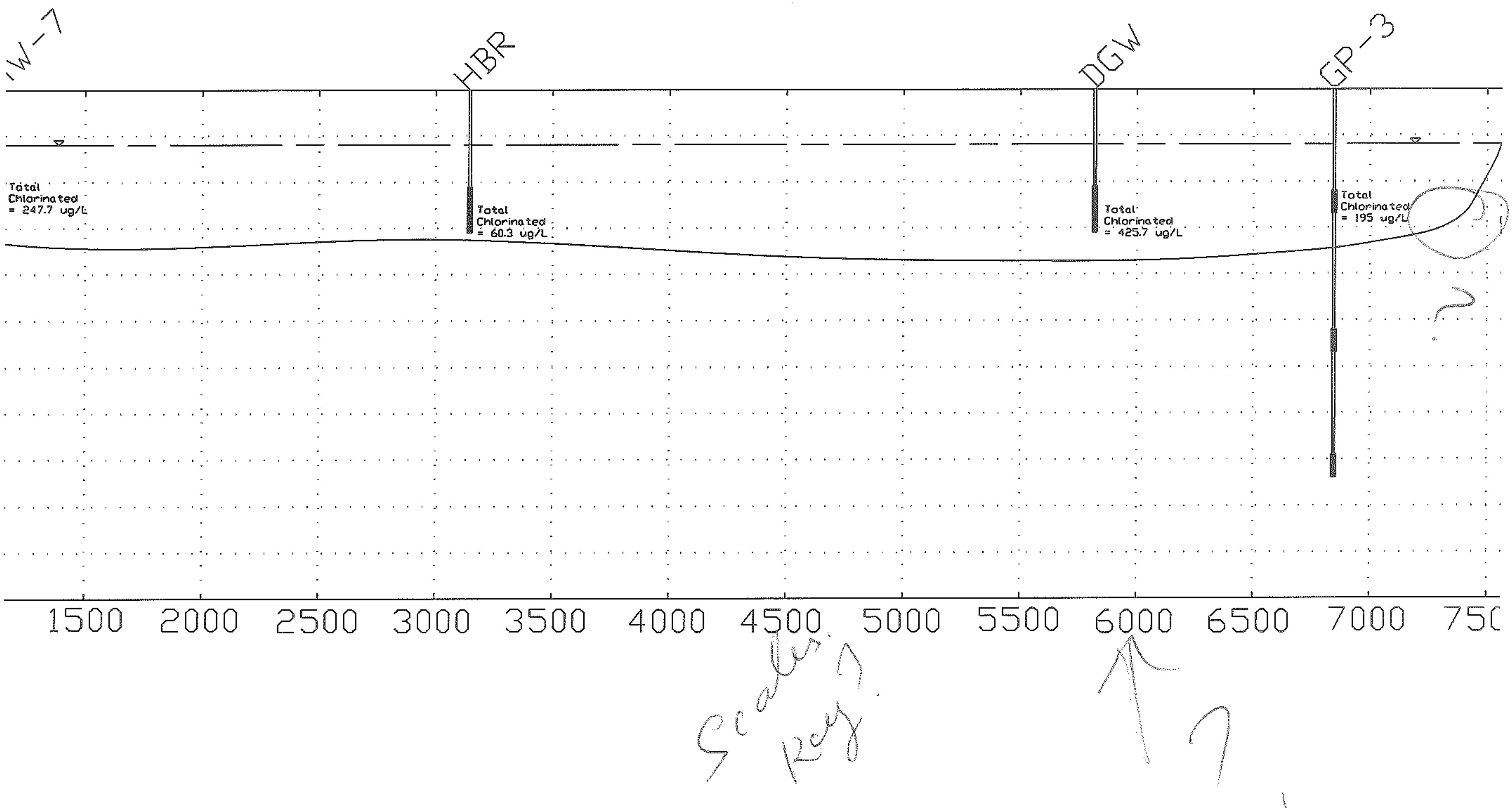
Total Chlorinated Solvents

Techalloy Company, Inc.
6509 Olsen Rd.
Union, IL. 60180

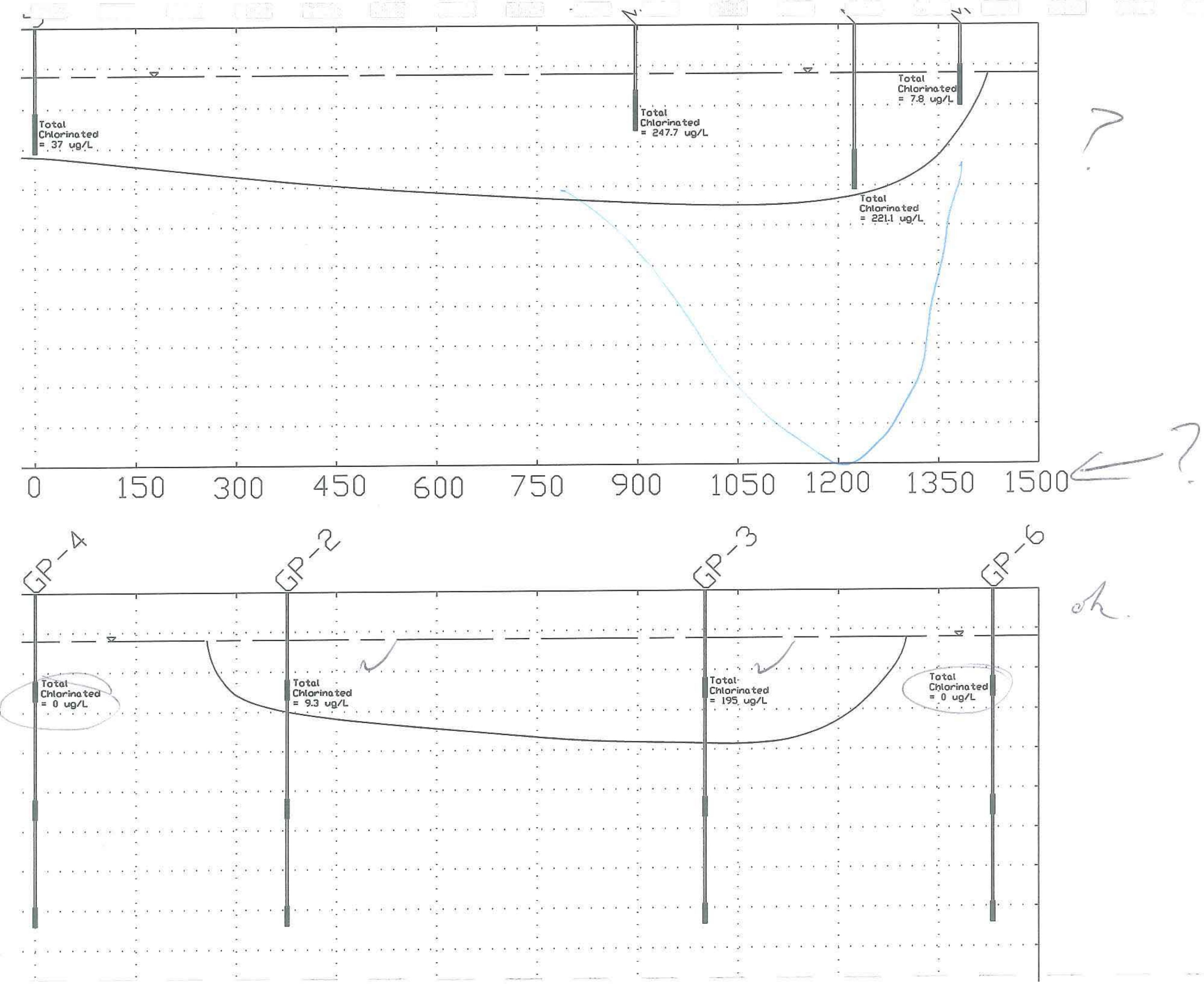
needs key!

SIZE	FSCM NO.	DWG NO.	REV
	04/13/2007		

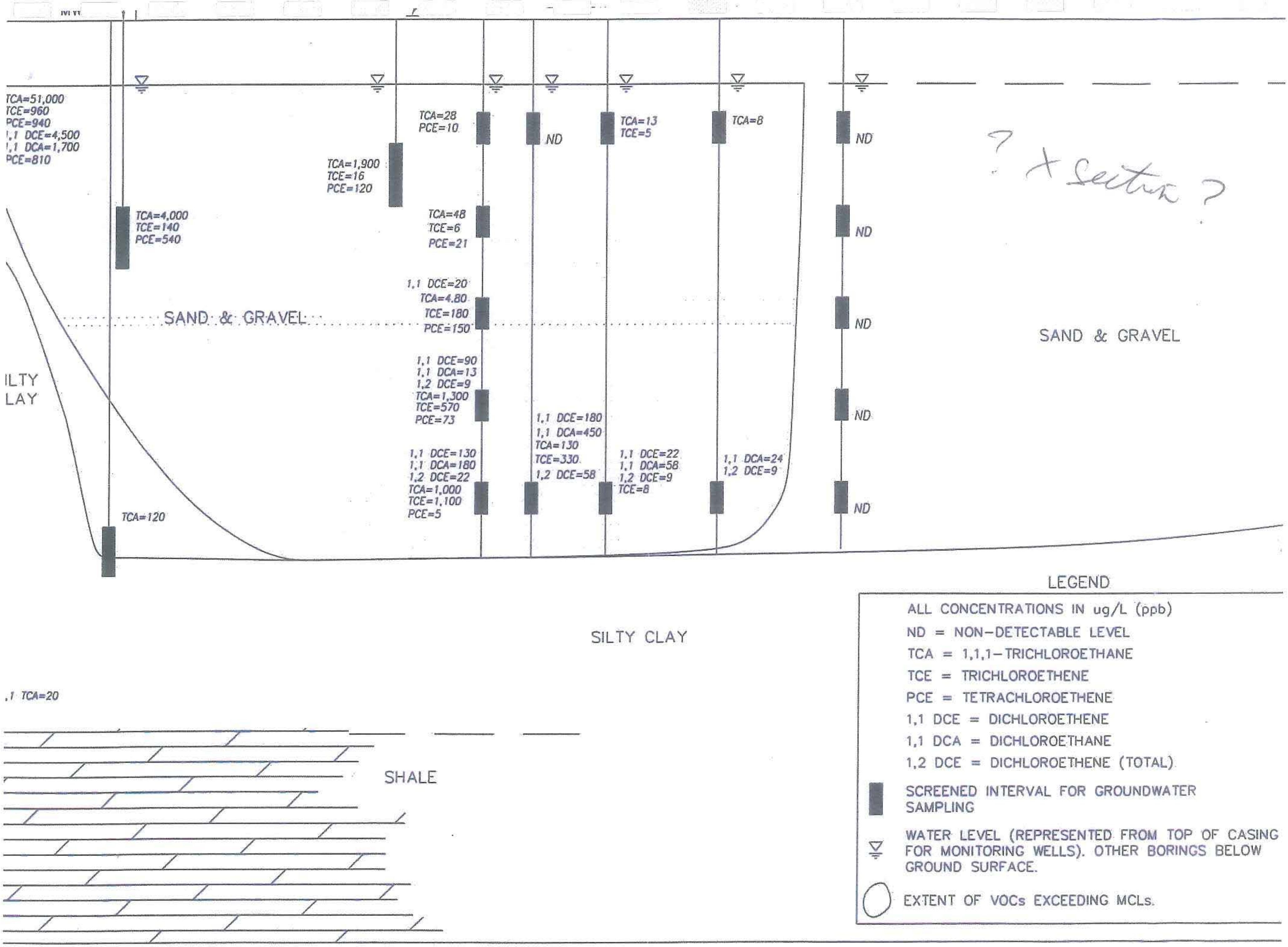
SCALE 1"=1000'	Drawn By: SFG	SHEET



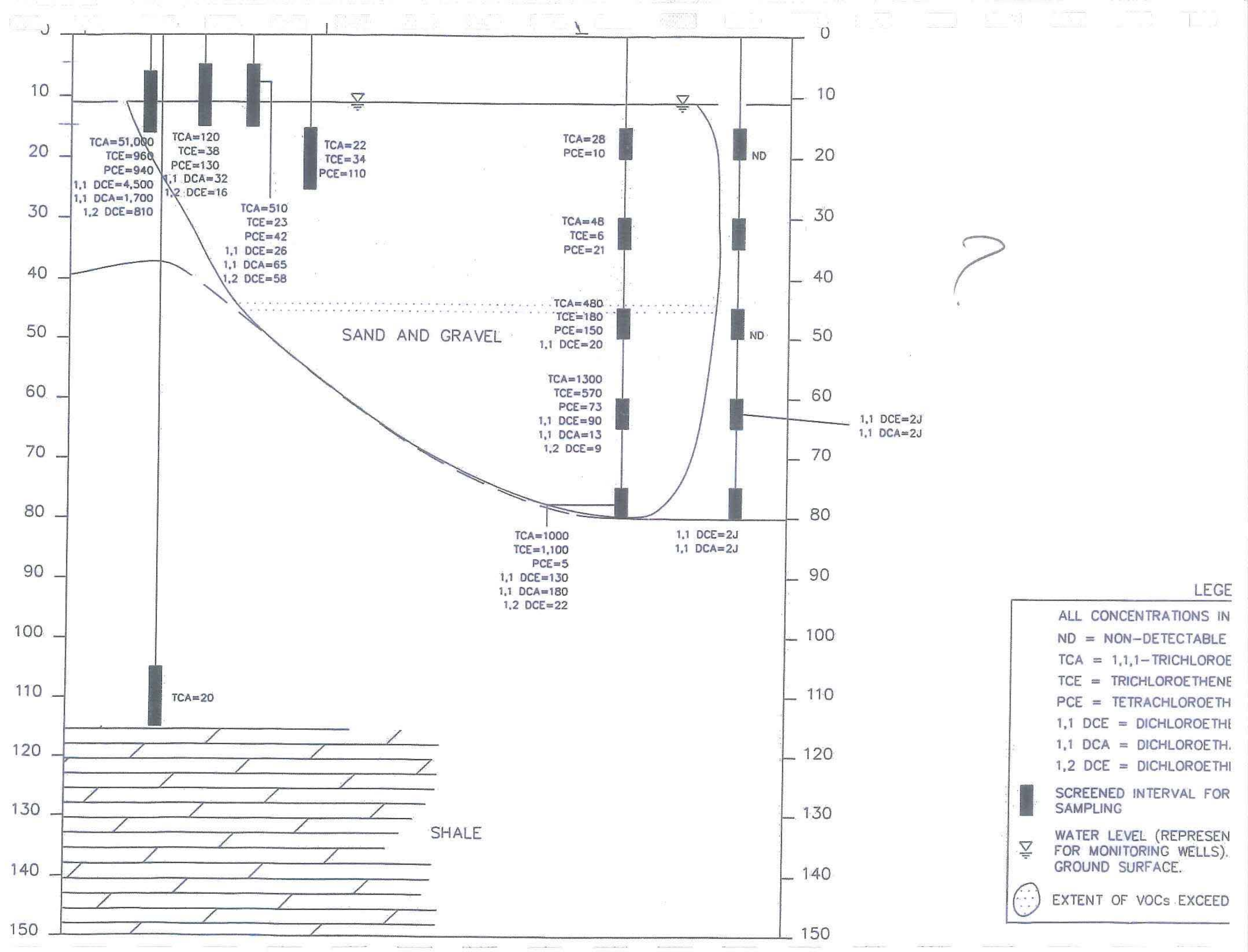
W-7
HBR
DGW
GP-3
Total
Chlorinated
= 247.7 ug/L
Total
Chlorinated
= 60.3 ug/L
Total
Chlorinated
= 425.7 ug/L
Total
Chlorinated
= 195 ug/L
1500
2000
2500
3000
3500
4000
4500
5000
5500
6000
6500
7000
750
Scale?
Key?
?



Total
Chlorinated
= 37 ug/L
Total
Chlorinated
= 247.7 ug/L
Total
Chlorinated
= 7.8 ug/L
Total
Chlorinated
= 221.1 ug/L
?
?
0
150
300
450
600
750
900
1050
1200
1350
1500
GP-4
GP-2
GP-3
GP-6
ok
Total
Chlorinated
= 0 ug/L
Total
Chlorinated
= 9.3 ug/L
Total
Chlorinated
= 195 ug/L
Total
Chlorinated
= 0 ug/L



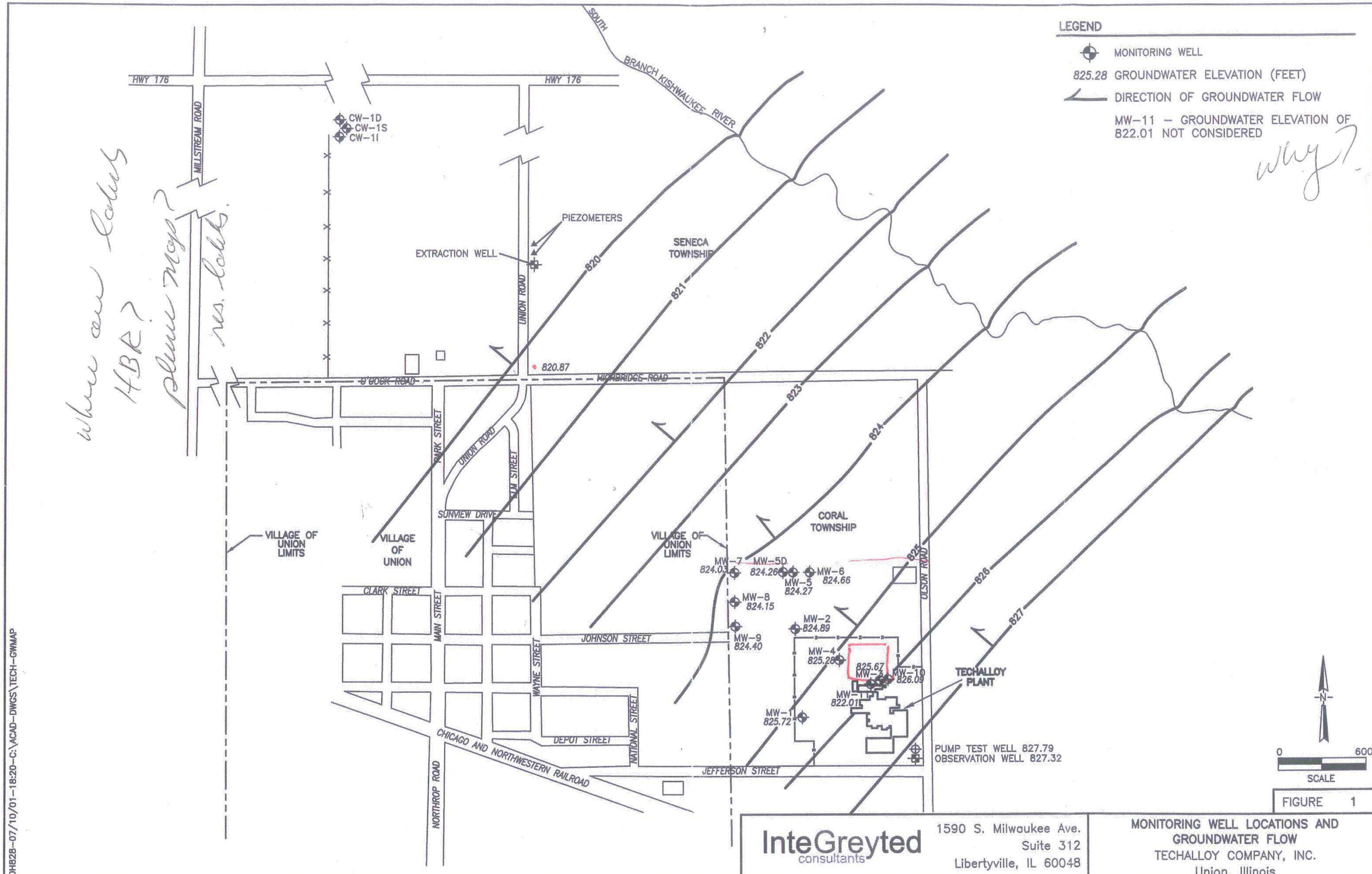
TCA=51,000
TCE=960
PCE=940
1,1 DCE=4,500
1,1 DCA=1,700
PCE=810
TCA=4,000
TCE=140
PCE=540
TCA=120
TCA=1,900
TCE=16
PCE=120
TCA=28
PCE=10
TCA=48
TCE=6
PCE=21
1,1 DCE=20
TCA=4.80
TCE=180
PCE=150
1,1 DCE=90
1,1 DCA=13
1,2 DCE=9
TCA=1,300
TCE=570
PCE=73
1,1 DCE=130
1,1 DCA=180
1,2 DCE=22
TCA=1,000
TCE=1,100
PCE=5
ND
1,1 DCE=180
1,1 DCA=450
TCA=130
TCE=330
1,2 DCE=58
TCA=13
TCE=5
1,1 DCE=22
1,1 DCA=58
1,2 DCE=9
TCE=8
TCA=8
1,1 DCA=24
1,2 DCE=9
ND
ND
ND
ND
ND
SAND & GRAVEL
SILTY CLAY
SAND & GRAVEL
? X Section ?
SILTY CLAY
,1 TCA=20
SHALE
LEGEND
ALL CONCENTRATIONS IN ug/L (ppb)
ND = NON-DETECTABLE LEVEL
TCA = 1,1,1-TRICHLOROETHANE
TCE = TRICHLOROETHENE
PCE = TETRACHLOROETHENE
1,1 DCE = DICHLOROETHENE
1,1 DCA = DICHLOROETHANE
1,2 DCE = DICHLOROETHENE (TOTAL)
SCREENED INTERVAL FOR GROUNDWATER SAMPLING
WATER LEVEL (REPRESENTED FROM TOP OF CASING FOR MONITORING WELLS). OTHER BORINGS BELOW GROUND SURFACE.
EXTENT OF VOCs EXCEEDING MCLs.



TCA=51,000
TCE=960
PCE=940
1,1 DCE=4,500
1,1 DCA=1,700
1,2 DCE=810
TCA=120
TCE=38
PCE=130
1,1 DCA=32
1,2 DCE=16
TCA=510
TCE=23
PCE=42
1,1 DCE=26
1,1 DCA=65
1,2 DCE=58
TCA=22
TCE=34
PCE=110
TCA=28
PCE=10
TCA=48
TCE=6
PCE=21
TCA=480
TCE=180
PCE=150
1,1 DCE=20
TCA=1300
TCE=570
PCE=73
1,1 DCE=90
1,1 DCA=13
1,2 DCE=9
TCA=1000
TCE=1,100
PCE=5
1,1 DCE=130
1,1 DCA=180
1,2 DCE=22
ND
ND
1,1 DCE=2J
1,1 DCA=2J
1,1 DCE=2J
1,1 DCA=2J
TCA=20
SAND AND GRAVEL
SHALE
?
LEGE
ALL CONCENTRATIONS IN
ND = NON-DETECTABLE
TCA = 1,1,1-TRICHLOROE
TCE = TRICHLOROETHENE
PCE = TETRACHLOROETH
1,1 DCE = DICHLOROETHI
1,1 DCA = DICHLOROETH.
1,2 DCE = DICHLOROETHI
SCREENED INTERVAL FOR SAMPLING
WATER LEVEL (REPRESEN FOR MONITORING WELLS). GROUND SURFACE.
EXTENT OF VOCs EXCEED

ATTACHMENT 4

PREVIOUS HYDRAULIC HEAD



LEGEND
MONITORING WELL
825.28 GROUNDWATER ELEVATION (FEET)
DIRECTION OF GROUNDWATER FLOW
MW-11 – GROUNDWATER ELEVATION OF 822.01 NOT CONSIDERED
why?
where are labs
HBR?
plume map?
res. labs.
HWY 176
HWY 176
MILLSTREAM ROAD
SOUTH BRANCH KISHWAUKEE RIVER
CW-1D
CW-1S
CW-1I
PIEZOMETERS
EXTRACTION WELL
UNION ROAD
SENECA TOWNSHIP
820
821
822
823
824
825
826
827
820.87
O'COCK ROAD
HIGHBRIDGE ROAD
PARK STREET
UNION ROAD
ELM STREET
SUNVIEW DRIVE
VILLAGE OF UNION LIMITS
VILLAGE OF UNION
VILLAGE OF UNION LIMITS
CORAL TOWNSHIP
OLSON ROAD
MW-7 824.03
MW-5D 824.26
MW-5 824.27
MW-6 824.66
MW-8 824.15
MW-2 824.89
MW-9 824.40
MW-4 825.28
825.67
MW-3
MW-10 826.09
MW-11 822.01
MW-1 825.72
TECHALLOY PLANT
CLARK STREET
MAIN STREET
JOHNSON STREET
WAYNE STREET
DEPOT STREET
NATIONAL STREET
CHICAGO AND NORTHWESTERN RAILROAD
NORTHROP ROAD
JEFFERSON STREET
PUMP TEST WELL 827.79
OBSERVATION WELL 827.32
N
0
600'
SCALE
FIGURE 1
InteGreyted consultants
1590 S. Milwaukee Ave. Suite 312 Libertyville, IL 60048
MONITORING WELL LOCATIONS AND GROUNDWATER FLOW
TECHALLOY COMPANY, INC.
Union, Illinois
DH828-07/10/01-18:20-C:\ACAD-DWGS\TECH-GWMAP